THE BRICKBUILDER

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MUNICIPAL REQUIREMENTS FOR THE THICKNESS OF WALLS.

AS the laws regulating the construction of buildings in our larger cities have, as a rule, been prepared with great care by men who have had much experience in building construction, and who in many cases are acknowledged experts, a comparative study of these laws as far as they relate to the thickness of brick walls ought to bring out much interesting information, besides, in a general way, giving comparative values of the brickwork in different sections of the country. It should be remembered that these thicknesses were arrived at almost entirely as the results of experience, and not by empirical or mathematical rules or formulas. Neither has the strength of the brickwork been in all cases the controlling consideration, as the effect of the action of fire in imperilling the stability of the wall has in most cases caused the thickness to be increased over what would be necessary for strength under ordinary conditions. As an instance of this, there are many old four-story dwellings in Boston with swell fronts which have only eight-inch walls, and which have stood for fifty years without developing a crack, but to-day it would be impossible to erect such buildings in any large city without increasing the thickness of the walls, although eight-inch walls thirty-three feet high are still permitted in Boston. At present, the thickness of walls required in Boston is greater than that in any other city having equally as good brick, and, in fact, thicker than in many cities having much poorer brick.

It is well known that thick walls resist the action of fire and water much better than thin ones; they also add greatly to the stability of high buildings.

In regulating the thickness of walls for buildings, it is customary to classify the buildings according to the purpose for which they are to be used, giving a different thickness to the different classes. In most cities three classes of buildings are recognized; viz., dwellings, business buildings or warehouses, and public buildings. When the last are classed separately, the thickness of the walls is left in a great measure to the discretion of the building inspector, as no general rule can be made to apply to them. The other two classes may be distinguished by the terms, "dwellings" and "warehouses." The kind of buildings grouped under these classifications, however, differ greatly in different cities, as will be seen from the following schedule of five representative cities.

BUILDINGS CLASSED AS DWELLINGS.

Boston: Private residences only.

New York: Residences, tenement houses, apartment houses, hotels, and schoolhouses.

Chicago: Residences, tenement houses, boarding or lodging houses, hotels, and office buildings.

Minneapolis: Dwelling houses only (meaning of term not defined).

*Denver:** Same as in Chicago, except that *all* buildings over eight stories high are classed as warehouses.

BUILDINGS CLASSED AS WAREHOUSES.

Boston: All buildings other than dwellings.

New York: Warehouses, stores, office buildings, factories, and stables.

Chicago: All buildings devoted to the sale, storage, or manufacture of merchandise, and all stables.

Minneapolis: Business, manufacturing, and public buildings.

Denver: Same as Chicago, except that stables covering less than twelve hundred square feet are classed with dwellings.

Minneapolis and Milwaukee make a third classification, which especially provides for buildings in which the first story is occupied for business purposes, and the stories above as dwellings.

It will be noticed that Chicago and Denver are at present the only two cities which put dwellings and office buildings under the same classification,† although New York comes very near it, in including hotels. There appears to be no good reason, however, why the walls of a dwelling should not be as thick as those of any office building of the same height and area, or, *vice versa*, why the latter should have thicker walls than a dwelling. The line loads on both are about the same, and there is nothing to cause an outward thrust against the walls. Private residences are seldom over five stories high, so that above that limit they practically drop out, and it is generally admitted that the walls of high buildings should be thicker in proportion than those of low ones. Although opinions may differ in regard to the classification of office buildings, it seems as though there can be no good reason for making a distinction between dwellings, tenement houses, flats, and hotels, as they are all, essentially, dwelling houses.

The following table shows the thickness of walls for buildings classed as warehouses in the cities above named, and also in Memphis. In compiling this table, the top of the second floor has been taken at nineteen feet above the sidewalk, and the height of the other stories at thirteen feet four inches, including the thickness of the floor, as the New York and Boston laws give the height of the walls in feet, instead of in stories. If the stories were greater than these, the thickness of the wall in some cases would have to be increased.

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*The law here quoted was prepared by a committee of the Colorado chapter of the A. I. A., and has not yet been adopted by the city council, but undoubtedly will be within a short time.

† In Denver, an especial provision is made for small brick houses.

THICKNESS OF WALLS IN INCHES FOR WAREHOUSES, ETC.

Height of Building.		Stories.											
		1st	2d	3d	4th	5th	6th	7th	8th	9th	10	11th	12th
Two Stories.	Boston	16	12	...	...	...	...	...	..	...	...	...	...
	New York	12	12	...	...	...	...	...	...	...	...	...	...
	Chicago	12	12	...	...	...	...	...	...	...	...	...	..
	Minneapolis	12	12	...	...	...	...	...	...	...	...	...	...
	Memphis	18	13	...	...	...	...	...	...	...	...	...	...
	Denver	13	13	...	...	...	...	...	...	...	...	...	...
Three Stories.	Boston	20	16	16	...	...	...	...	...	...	...	...	...
	New York	16	16	12	...	...	...	...	...	...	...	...	...
	Chicago	16	12	12	...	...	...	...	...	...	...	...	...
	Minneapolis	16	12	12	...	...	...	...	...	...	...	...	...
	Memphis	22½	18	13	...	...	...	...	...	...	...	...	...
	Denver	17	13	13	...	...	...	...	...	...	...	...	...
Four Stories.	Boston	20	16	16	16	...	...	...	...	...	...	...	...
	New York	16	16	16	12	...	...	...	...	...	...	...	...
	Chicago	20	16	16	12	...	...	...	...	...	...	...	...
	Minneapolis	16	16	12	12	...	...	...	...	...	...	...	...
	Memphis	27	22½	18	13	...	...	...	...	...	...	...	...
	Denver	21	17	13	13	...	...	...	...	...	...	...	...
Five Stories.	Boston	20	20	20	20	16	...	...	...	...	...	...	...
	New York	20	16	16	16	16	...	...	...	...	...	...	...
	Chicago	20	20	16	16	16	...	...	...	...	...	...	...
	Minneapolis	20	16	16	12	12	...	...	...	...	...	...	...
	Memphis	31½	27	22½	18	13	...	...	...	...	...	...	...
	Denver	21	21	17	17	13	...	...	...	...	...	...	...
Six Stories.	Boston	24	20	20	20	20	16	...	...	...	...	...	...
	New York	24	20	20	20	16	16	...	...	...	...	...	...
	Chicago	20	20	20	16	16	16	...	...	...	...	...	...
	Minneapolis	20	20	16	16	16	12	...	...	...	...	...	...
	Memphis	36	31½	27	22½	18	13	...	...	...	...	...	...
	Denver	26	21	21	17	17	13	...	...	...	...	...	...
Seven Stories.	Boston	24	20	20	20	20	20	16	...	...	...	...	...
	New York	28	24	24	20	20	16	16	...	...	...	...	...
	Chicago	20	20	20	20	16	16	16	...	...	...	...	...
	Minneapolis	20	20	20	16	16	16	12	...	...	...	...	...
	Memphis	40½	36	31½	27	22½	18	13	...	...	...	...	...
	Denver	26	21	21	21	17	17	17	...	...	...	...	...
Eight Stories.	Boston	28	24	20	20	20	20	20	16	...	...	...	...
	New York	32	28	24	24	20	20	16	16	...	...	...	...
	Chicago	24	24	20	20	20	16	16	16	...	...	..	...
	Minneapolis	24	20	20	20	16	16	16	12	...	...	...	...
	Memphis	45	40½	36	31½	27	22½	18	13	...	...	...	...
	Denver	30	26	21	21	21	17	17	17	...	...	...	...
Nine Stories.	Boston	28	24	24	20	20	20	20	20	16	...	...	...
	New York	32	32	28	24	24	20	20	16	16	...	...	...
	Chicago	24	24	24	20	20	20	16	16	16	...	...	...
	Minneapolis	24	24	20	20	20	16	16	16	12	...	...	...
	Memphis	49½	45	40½	36	31½	27	22½	18	13	...	...	...
	Denver	30	26	26	21	21	21	17	17	17	...	...	...
Ten Stories.	Boston	28	28	24	24	20	20	20	20	20	16	...	...
	New York	36	32	32	28	24	24	20	20	16	16	..	...
	Chicago	28	28	24	24	24	20	20	20	16	16	...	...
	Minneapolis	24	24	24	20	20	20	16	16	16	12	...	...
	Memphis	54	49½	45	40½	36	31½	27	22½	18	13	...	...
	Denver	30	30	26	26	21	21	21	17	17	17	...	...
Eleven Stories.	Boston	32	28	28	24	24	20	20	20	20	20	16	...
	New York	36	36	32	32	28	24	24	20	20	16	16	...
	Chicago	28	28	24	24	24	20	20	20	16	16	16	...
	Minneapolis	28	24	24	24	20	20	20	16	16	16	12	...
	Denver	30	30	26	26	26	21	21	21	17	17	17	...
Twelve Stories.	Boston	36	32	32	28	28	24	20	20	20	20	20	16
	New York	40	36	36	32	32	28	24	24	20	20	16	16
	Chicago	28	28	28	24	24	24	20	20	20	16	16	16
	Minneapolis	28	28	24	24	24	20	20	20	16	16	16	12
	Denver	30	30	30	26	26	26	21	21	21	17	17	17

The maximum height of stories permitted by the Chicago ordinance with these thicknesses of walls is eighteen feet in first story, fifteen in second, thirteen and a half in the third, and twelve feet in the stories above.

It will be seen from the above table that Memphis has much the heaviest walls of any city, which presumably is on account of poor material; Boston ranks second, and Minneapolis has the thinnest walls. The Chicago ordinance, however, provides that if the depth of the building is less than one hundred feet, and the width less than twenty-six feet, the thickness of the walls may be reduced four inches which would make them thinner than the Minneapolis requirements.

New York permits the front and rear walls to be four inches less in thickness than in the table, but in the other cities mentioned all external walls are required to be of the same thickness. Although there is a great difference in the thicknesses above given, more indeed than there should be, for we ought to be able to agree more closely on what is required for the safety of buildings, at least; yet a general rule might be deduced from the table for building over four stories in height, which would be something as follows: —

For brick equal to those used in Boston or Chicago make the *thickness of the three upper stories sixteen inches*, of the next three below twenty inches, the next three twenty-four inches, and the next three twenty-eight inches. For a poorer quality of material, make only the *two* upper stories sixteen inches thick, the next three twenty inches, and so on down.

In buildings less than five stories in height, the top story may be twelve inches in thickness.

Without quoting further from the building regulations the following general principles will be found to be recognized in all of the later laws: —

First, That walls of warehouses and mercantile buildings should be heavier than those used for living or office purposes.

Second, That high stories, and clear spans exceeding twenty-five feet, require thicker walls.

Third, That the length of the wall is a source of weakness, and that the thickness should be increased four inches for every twenty-five feet over 100 or 125 feet in length. (In New York, the thicknesses in the table must be increased for buildings exceeding 105 feet in depth. In the Western cities, the tables are compiled for warehouses 125 feet in depth, as that is the usual depth of lots in Western cities.)

Fourth, That walls containing over thirty-three per cent of openings should be increased in thickness.

Fifth, Partition walls may be four inches less in thickness than the outside walls if not over sixty feet long, but no partition to be less than eight inches thick.

Sixth, That when brick of sufficient strength are available, the stability of the wall, particularly in case of fire, is increased by supporting the floor joist on ledges corbelled from the wall. (This is obligatory in Chicago for warehouse walls twelve and sixteen inches thick, and for eight and twelve inch walls in dwellings.)

PARTY WALLS.

There is much diversity in building regulations regarding the thickness of party walls, although they all agree in that such walls should never be less than twelve inches thick. About one half of the laws require the party walls to be of the same thickness as external walls; the remainder are about equally divided between making the party walls four inches thicker or thinner than for independent side walls.

When the walls are proportioned by the rule previously given, the writer believes that the thickness of the party walls should be increased four inches in each story. The floor loads on party walls is obviously twice that on side walls, and the necessity for thorough fire protection is greater in the case of party walls than in other walls.

F. E. Kidder.

TERRA-COTTA CAPITAL.

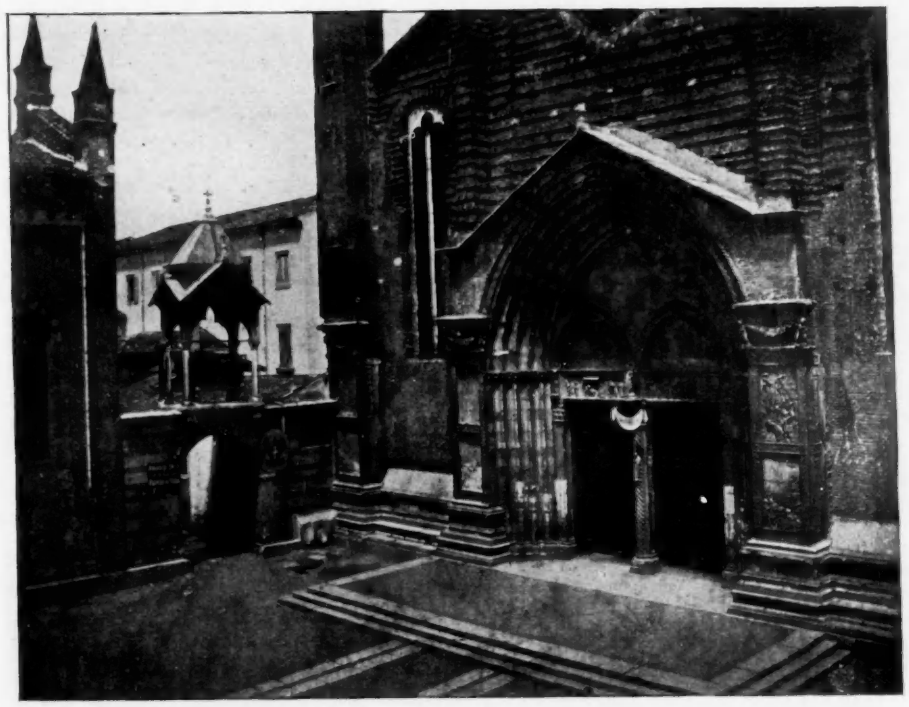
Fiske, Homes & Co., Makers, Boston.

BRICK AND MARBLE IN THE MIDDLE AGES.

(*Continued.*)

CHAPTER VI. — CONTINUED.

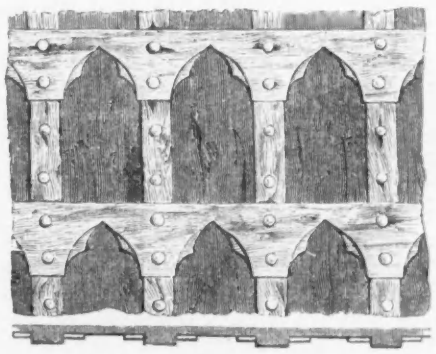
THE west front of the church stands in a small piazza, on the north side of which is the little church of San Pietro Martire, between the east end of which and Sta. Anastasia is a wall dividing a small burial ground from the Piazetta. On the top of this wall, and supported upon corbels, is one of those monuments peculiarly associated



WEST FRONT OF STA. ANASTASIA AT VERONA, SHOWING CORNER OF S. PIETRO MARTIRE.
SUPPLEMENTARY ILLUSTRATION TO "BRICK AND MARBLE IN THE MIDDLE AGES."

with Verona, because so numerous there, though they are often met with elsewhere in Italy. They are either large, pyramidal canopies supported upon trefoiled arches, resting on four marble shafts, with a kind of sarcophagus or an effigy beneath; or else, when attached to a wall, they have two detached shafts supporting the same kind of trefoiled arch and surmounted by a flattish pediment. Their effect is almost invariably beautiful in the extreme, and their only defect is that they all require to be held together by rods of iron connecting the capitals of the columns. This, however, is soon forgotten when one feels that there is no pretence ever or anywhere at its concealment; and, notwithstanding this slight defect, one cannot help loving and admiring them, for there is a grace and beauty about the form and proportion of the Veronese trefoiled arch such as is never seen, I think, elsewhere, and the very flatness of the carving and the absence of deep moulding seem all adopted in order that nothing may interfere with the simple beauty of the outline of the arch. In this case the monument is supported on a large slab of stone corbelled forward and balanced upon the top of a thin wall over the archway which leads into the churchyard of San Pietro. Four shafts with sculptured capitals, resting on the angles of this slab, support four trefoiled arches (those at the ends narrower than the others), which are almost destitute of moulding, save that the outer line of the arch has a broad band of delicate sculpture all round it. The arch terminates in a small cross, and above on each side is a very flat pediment, moulded and finished on the under side with one of the favorite Italian arcaded corbel tables; the finish is a heavy pyramidal mass of stone rising from behind the pediments. The four bearing-shafts are of white marble, all the rest of the monument of red. Within the four supporting shafts stands the sarcophagus, supported on the backs of couchant lions, very plain, but ornamented at the angles in very classic fashion, and bearing a recumbent effigy.

The church of San Pietro has three or four smaller monuments enclosed within its small courtyard. Two of them are on the ground and have round arches on detached shafts with an Agnus Dei carved in the centre. The third is corbelled out from the wall, and the face of the monument is covered with sculpture, that of the figures being very inferior in style to that of the foliage enrichments. This little group of monuments, varying in date from 1283 to 1392, is well worth study, and I found it more than usually interesting, owing to its entire unlikeness to any English work. The church against which these monuments are built is small, but deserves notice; it is of brick, with a stone canopy on shafts corbelled out above the west door; the buttresses are mere pilasters, and run up without any weathering till they finish in an arcaded corbel table at the eaves; the windows have wide brick splays outside, and trefoil heads of stone without any chamfer or moulding. On the south side, the church — in point of size a mere chapel — is divided into four bays, one of which has a monument corbelled out by the side of the window. It is built entirely of red brick, not relieved in any way, except that the window arches are in alternate voussoirs of brick and stone. The wooden framework of the west door deserves notice as being very unlike the English mode of door-framing, and very good in its effect. The accompanying sketch will best explain it, and it must be understood that, instead of being internal, as such framing would usually be in England, in this example it is external, just as in the somewhat similar door of Sta. Anastasia, of which I have already made mention.



Turning back from the Piazzetta of Sta. Anastasia, and traversing again the narrow and gratefully shady street by which we reached it, we soon found ourselves at the end of the Piazza dell' Erbe, the most picturesque square in the city, and at an early hour in the morning quite a sight to be seen. The whole open space was as full as it could be of dealers in vegetables and fruits, all of them protecting themselves and their stores from the intense glare of the sun under the shade of prodigious umbrellas, at least five times as large as any

of ordinary size, and certainly five times as bright in their colors, the prevailing color being a very bright red. Altogether it was a thoroughly foreign scene. The houses, some ancient, but all picturesque and irregular, surrounding the irregularly shaped piazza, the magnificent campanile of the Scaligeri Palace rising proudly behind the houses on the left, the fountain in the centre, and the great column of red Veronese marble rising close to us, which at one time bore the winged lion, — mark of the dominion of the Venetians, — all combined to produce a very striking picture. An hour or two later in the day when we passed, the people, the umbrellas, and the fruit were all gone, and somewhat of the charm of the place was gone with them.

From the Piazza dell' Erbe we went to the cathedral, anxious to see and hear somewhat of a service which we found was to take place. There was a great throng of people, and we had some difficulty in finding even standing room among them; we were not at all sorry, however, to have gone, for we came in for a sermon most energetically preached, and enforcing in very powerful language the necessity of repentance. The pulpit was very large, and as the preacher delivered his sermon, he walked from side to side, and often repeated again to those on his left the substance of what he had already said to those on his right. The people, who crowded every available place within hearing, were exceedingly silent and attentive, and at intervals the preacher stopped for a minute to cough and use his handkerchief, which was a signal for an immediate general blowing of noses and coughing all over the church. The "Ebben infelici!" with which he commenced his sermon was a good index to its whole tone, and makes me remember with pleasure the vast crowd listening to Christian doctrine in the grand nave of the Duomo. Would that we could see any prospect of the day when in England our larger churches may be used in this way, when, with pews and all their concomitant evils swept away, we may see a vast crowd standing and sitting, leaving no passageway and no waste room, anxious only that they may, by pressing near, join in the services at the altar, and hear every word of warning and of advice! The nave of Westminster, so thronged, would soon show how great has been our mistake in leaving our large churches so long unused.*

The Duomo is a really fine church, Romanesque in its shell, but altered completely internally in the fourteenth century. It has only five bays in length, but the dimensions are so large that the nave and aisles alone measure about 225 feet by 97 feet inside. There are slightly recessed Romanesque apses in the side walls, and a great tomb or shrine of St. Agatha, which is worth looking at. The columns in the interior are very lofty, of red marble, and, instead of being plain and cylindrical, as at Sta. Anastasia, are moulded with very good effect. Their capitals are, however, heavy, and the carving of the foliage on them not at all satisfactory. The whole interior is very solemn, and specially beautiful on this bright September day, with almost all the light excluded by thick curtains, here and there a stray gleam of the most intensely bright light finding its way through some chink, lighting up, with sudden brilliancy, the deep, cool shade, and — reflected from the bright surface of some great marble shaft — suggesting the grandeur which can hardly really be seen.

The choir is divided from the nave by a screen of marble, consisting of detached columns with Ionic capitals and a continuous cornice, the whole screen semicircular in plan, and coming forward into the nave. This, the work of Sanmichele, is certainly about the most effective work of this kind and age that I have seen.

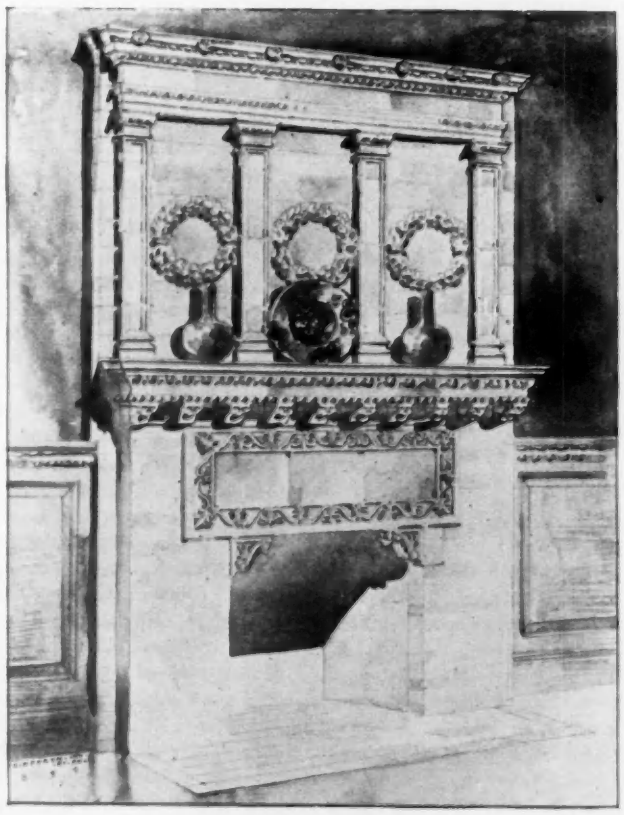
The west front of the Duomo is still in the main in its original state. It has a rich porch supported on shafts (whose bases rest on the backs of lions), and of two stages in height, a flat pediment surmounting the upper stage. Another flat pedimental cornice is carried over the whole front at the same level; but out of this a wall rises above the central portion the width of the nave, and height of the clerestory, which is again surmounted by a third flat pediment — a confused and not very graceful arrangement, which found an imitator in Palladio, when he built that ugliest of fronts, the west end of San Giorgio Maggiore at Venice.

The windows at the ends of the aisles are very Italian in their character. They are insertions in the wall of two narrow lights within an enclosing arch, which is again surrounded by a square line of moulding. The effect of this not uncommon Italian arrangement is exceedingly unsatisfactory, as it appears to make the window with its arch and tracery quite independent, constructively, of the wall in which it is placed; it appears in fact to be merely veneered on to the face of the wall.

On the north side of the cathedral is a cloister of good detail, which was originally of two stages in height, but is now considerably altered in parts. It is exceedingly similar to the cloister of San Zenone, which we shall see presently, consisting of a long arcade of pointed arches carried on marble shafts; it is now in a very ruinous condition.

The Baptistery — San Giovanni in Fonte — is a detached church near the east end of the cathedral, which does not look as if it had been at first intended for its present use. It is a building of the twelfth century, with nave and aisles ending in three apses, lighted by a small clerestory, and with some columns which are probably Roman. The font, which stands in the centre, is of enormous size, and is sculptured with eight subjects, beginning with the Annunciation and finishing with the Baptism of our Lord. These sculptures are very rude. The bason of the font is almost seven feet in diameter, and in its centre is another smaller bason of graceful shape. I do not happen to have seen an explanation of these inner basons in the fonts in Italian baptisteries. They look as if they were meant for the priest to stand in whilst he immersed the catechumens around him.

(*To be continued.*)

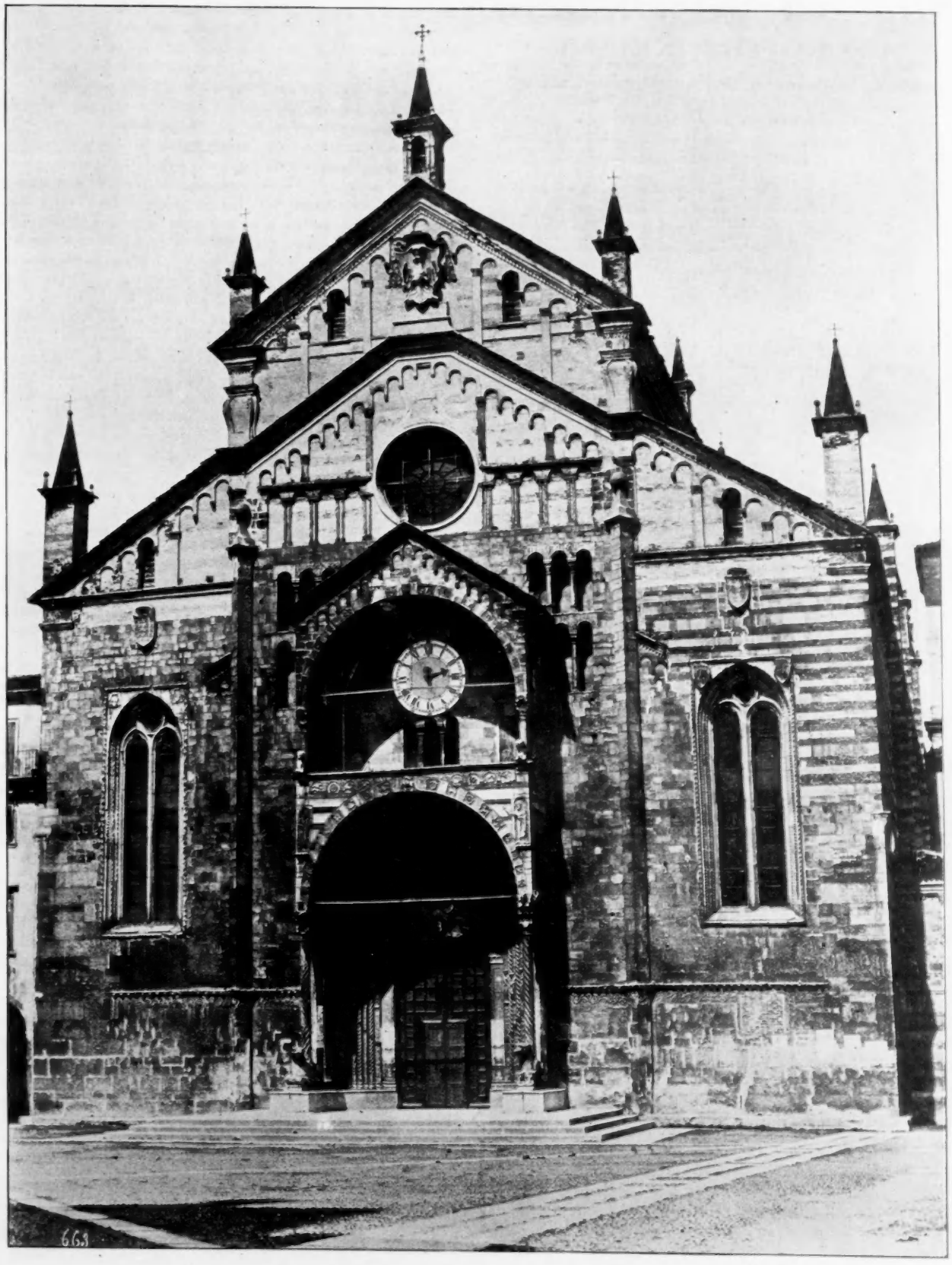


MANTEL.

DESIGNED BY J. A. SCHWEINFURTH.

Made by Fiske, Homes & Co., Boston, and carried in stock in Brick and Terra-Cotta in a variety of colors, both glazed and unglazed.

* I leave this passage as it originally stood. It is pleasant to feel how completely unnecessary it is now to use such language on the subject.



WEST FRONT OF THE CATHEDRAL, VERONA.

SUPPLEMENTARY ILLUSTRATION TO "BRICK AND MARBLE IN THE MIDDLE AGES."

THE ART OF BUILDING AMONG THE ROMANS.

Translated from the French of Auguste Choisy by Arthur J. Dillon.

CHAPTER II.—Continued.

IN speaking of ancient walls, we said the Romans had two kinds of masonry at their disposal, unrammed and rammed, and we noticed that only the first could be used for constructing walls with revetments of their bricks, because it alone could be made without auxiliary works, casings, or removable sheathing. The same conditions governed the building of vaults, and enable us to foresee which of the two kinds of masonry would be used in their construction. In building the vaults, the erection of an interior shell or mould to give the necessary shape to the rubble could not be avoided; but even if this shell or mould was indispensable, if, in other terms, a centring was necessary, an endeavor at least could be made to make it as cheap as possible; from this consideration the Romans decided as to which of the two kinds of masonry they would use. If they used rammed or tamped masonry they would have exposed the centring to shocks quite capable of loosening its assemblage, and, above all, there was the danger that the centring would be greatly deformed; near the springing it would have been strongly pressed together, while the outer revetments would at the same time be forced outward. (Fig. 11.)

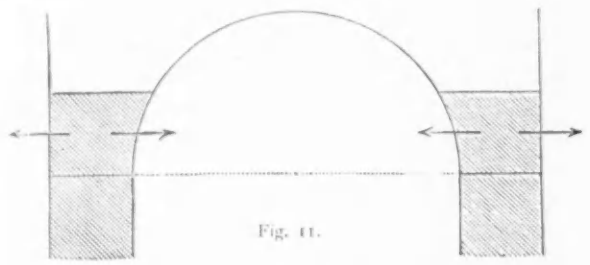


Fig. 11.

To resist such pressure it would have been necessary to build not only an interior centring, but also an exterior casing; and, indeed, every part of the temporary scaffolding would have had to be made solid to an extreme, in order to withstand the spreading due to the incessant shocks of the ramming. With these difficulties in view, evidently the wisest course was to avoid construction by ramming. This was the conclusion to which the Romans came; and everywhere that I have been able to make sure of the nature of its construction, the masonry of their vaults was made by exactly the same processes as that of their ordinary walls. Sometimes the materials used in the vaults were lighter than those of the walls, but the methods of using them were the same in both cases, and the masonry of vaults was never rammed.

Notwithstanding that the construction had been chosen in order to save centring, the pressure the vaults exerted on the supports was still very great in certain cases. As long as the masonry was only a little above the springing, it practically sustained itself, the successive courses corbelling out and tying, as it were, the overhanging portion A B S to the continuation of the imposts along A B (Fig. 12). The form of this portion A B S is not, in fact, greatly different from the theoretical profile to be given to a projecting solid which has to bear only its own weight, and, therefore, it was neither a difficult nor costly affair to sustain it. This lower part of the vault could, in case of necessity, have been built with any scaffolding except what would be sufficient to mould it and to give it the proper curvature; but this facility of execution diminished proportionately as the vault rose; the overhanging portions progressively pressing more heavily on the centrings, and the weight augmenting with extreme rapidity as the summit was approached. The vault would soon become a half fluid mass bearing with all its weight on the supporting works; the centring which a moment before seemed almost superfluous, must then be capable of great resistance, and the more perfect as the vaults were more compact and more massive, for the Roman vaults were never slight, the coarse structure of their masonry making it sometimes necessary to give them enormous dimensions. It was furthermore necessary to prop this mass of half-set material with perfectly firm supports, because to leave the masonry as yet in progress of solidifying unsupported was to run the risk of movements in the interior of the rubble, perhaps causing ruptures. In an ordinary vault of radiating keys, though the deflection of the centring is sometimes unfortunate, it is rarely disastrous; some of the beds of mortar may open, but the stability of the structure does not depend solely on the strength of the joints, for the mortar in this kind of vault serves to transmit the pressure, and is not a fundamental part of the masonry, being simply a cushion inserted between the keys; even should it split or disappear entirely the existence of the vault would not necessarily be compromised; its presence is so little necessary that in their cut-stone constructions the ancients never used it.

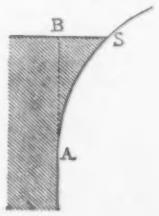


Fig. 12.

But in the rubble vaults of the Romans, mortar did not play this minor part, for it, and it alone, established the bond between the elements of the construction; and this bond once destroyed, there would remain but a shattered monolith, a ruined heap of masonry.

Therefore, to build a vault of small cemented materials, the centring had to be given an absolute stability; this was the first condition of success, and with ordinary centrings and scaffoldings this condition could only be filled with the greatest difficulty.

Accuracy, increase of the amount of wood, multiplication of the props, did not entirely solve the difficulty; for wood, even the best put together, moves, gives, and swells with the least change of temperature, and a monolithic vault incapable of following the deflections of the centring which served as its mould would constantly be threatened by the shrinkage, or eventual weakening of the centring, with a lack of support. I shall add that to give so much importance to temporary work would be out of the ordinary custom of the Roman builders. Accustomed to regard no work as useful except that which was durable, and, moreover, accustomed always to seek the simplest processes and solutions, it would be surprising to find them using such expensive and complicated auxiliary work in one case alone.

Moreover, if one takes into account the organization of the ancient work yards, he will be led by a different course to the same conclusion. At every point of the Empire the Romans had an unlimited number of hands at their disposal, but men who could be intrusted with such important work as centrings were not so easily found. When the masonry to be built called for only a simple expenditure of physical strength, it was easy to recruit the workmen from the population subject to forced labor, the army, and the slaves; but as soon as it was a question of scientific and difficult construction, such as that of rigid and inflexible centrings, their resources were more limited; they would not only be obliged to assemble, at great expense, a large number of skilled artisans, but in addition they would have to resign themselves to unavoidable delays, and when, by dint of money and time, they had succeeded in putting whole forests in place to support the masonry of their enormous vaults without risk of deflection, the day after the work was finished they would find all the cost without direct result, and the whole expensive apparatus would disappear without leaving a trace. Such a profitless expenditure of difficult and costly labor was antagonistic to the practical minds of the Romans; and in their attempts to avoid it, and to escape as much as possible the necessity of a temporary centring, the simple and ingenious idea of giving the vaults this kind of interior scaffolding of brick, which supported the mass during construction, and prevented the masonry from bearing its full weight on the temporary centring, was suggested.

(*To be continued.*)

RECENT BRICKWORK IN AMERICAN CITIES

DENVER.

DENVER is distinctly a city of brick and stone. Within the past five years, during which all of our best buildings have been built, not a single wooden building has been erected. In 1891 and 1892, a few residences were erected with the second story of frame construction, but even these are now prohibited by the building ordinance. Stone, being obtained near the city, in unlimited quantity and good quality, is used almost entirely for trimmings, and many buildings are entirely faced with stone. A few are of solid stone construction. Terra-cotta has been used to some extent, but as the nearest works are over a thousand miles away, the freight, added to the cost of manufacture, makes this material more expensive with us than stone, unless highly enriched, and with the ornamental parts repeated several times. In time, terra-cotta works will undoubtedly be established here, as there is abundance of suitable clay for its manufacture.

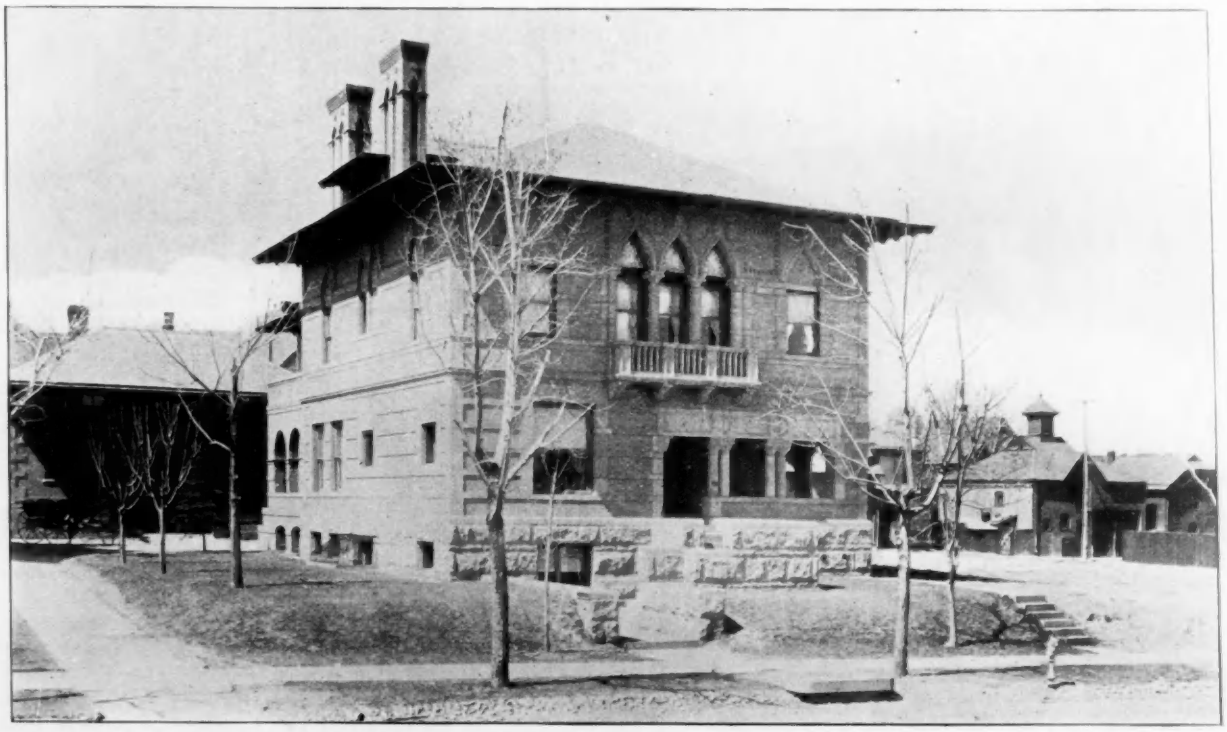
Although brick has been so extensively used for all classes of buildings, there are not many examples of distinctively brick architecture, unless we consider the two and three story flat-roofed buildings as such; but as a rule, they are not examples to be admired or copied.

The better class of recent brick buildings are faced with pressed brick, which are made here in several shades of red, buff, cream, white, and pink.

There are, however, no examples of mottled and variegated brickwork, and whatever shade of brick has been selected, the greatest care has been exercised to select the brick so that the wall shall show a perfectly uniform shade of color, which gives a hard, mechanical appearance, and lacks the artistic effect seen in Eastern brickwork; the great desideratum with the people (I do not think it is always so with the architects) seeming to be to make the work as perfect mechanically as possible. There are also very few buildings in which more than one color of brick has been used, and these as a rule have not proved a success.

With a few exceptions, the best examples of brick architecture in Denver are to be found in the residence portions of the city, although the most expensive residences are of stone. Being obliged to design their houses for brick construction, the architects of Denver have had to rely almost entirely upon their own ingenuity (the city house as found in Eastern cities not being known here), and the result has not been bad. Ugly houses undoubtedly predominate, as I think may safely be said of all American cities, especially of the newer ones, in which the softening effects of time have not yet had a chance to tone down the defects. There is too much of a tendency in Western people to overdeck their houses, for the sake of making them showy, and it is sometimes a difficult task for the architect to satisfy his client, without putting in more features than he would like. Nevertheless, there is a good proportion of unobjectionable houses, and a few examples of really good brick residences.

During our long summers, almost entirely free from rain, and our delightfully cool evenings, without dew or dampness, the residents spend a large portion of their time on their porches, so that a porch of some kind is an almost indispensable adjunct to every residence. Thus far, most of these porches have been built of wood, and the eaves and gables are also generally of wood, merely the walls of the building being of brick. It is very difficult to design a wooden porch that will look well against a brick house, as it almost always has a "stuck on" effect; but for moderate-priced houses there does not seem to be anything else to do. Most of the brick porches that have been built are not porches in the true sense of the word, but are recesses, or loggias, in the first story.



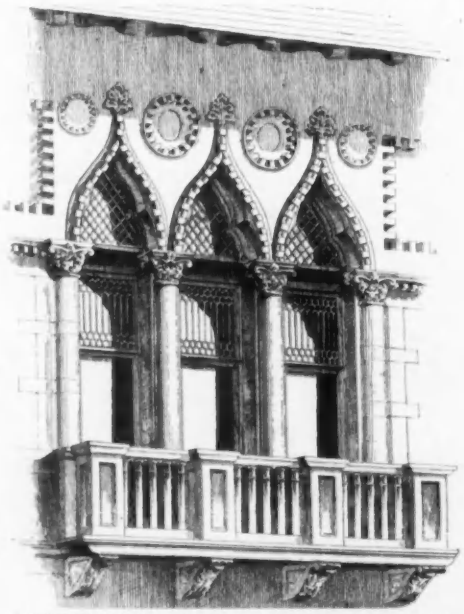
RESIDENCE OF DR. CHARLES DENNISON, DENVER, COL. A. C. SCHWEINFURTH, ARCHITECT.

One of the best examples of an entirely brick house is the residence of Dr. Lemon, designed by Mr. A. C. Schweinfurth some four years ago. As may be seen from the photograph, the design is in

the Romanesque style, and may be by some considered too heavy for a residence; but the mass is very good, and the house is generally liked. The porches are the distinguishing features of the design. The brick are a very dark red, and the trimmings are of a dark chocolate stone. The detail of the porch caps is excellent, and thoroughly in keeping with the design.

Another brick residence by the same architect is that of Dr. Charles Dennison (see photograph on preceding page), which is built of pink-colored brick, with stone trimmings of almost exactly the same shade, and marked like marble. This house is generally considered by architects, I think, as the handsomest brick house in the city. The design is Venetian, with Romanesque carving. The recess and balcony in the front of the second story are of stone, and very artistically detailed.

On the sides the trimmings are of brick, the detail shown in the sketch of the chimney being carried around the windows. The porch in this house, as will be seen, is in the form of a loggia, in the northeast corner of the first story.



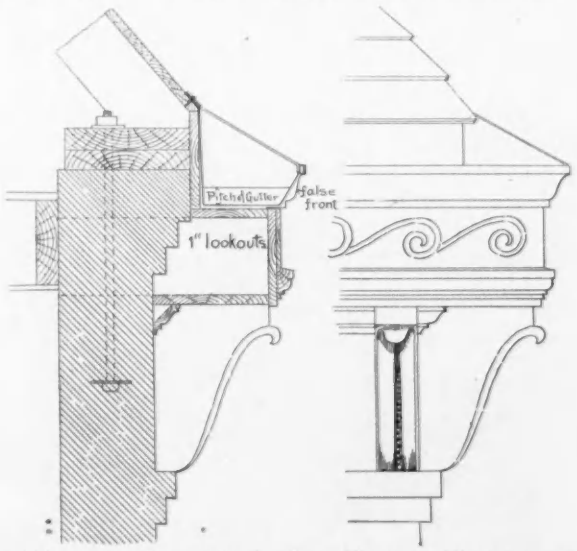
CHIMNEY-TOP AND BALCONY ON HOUSE OF DR. CHARLES DENNISON.

An entirely different design from either of these is shown in the photograph of a house on Pennsylvania Avenue by Mr. F. E. Kidder, which is built of a cream-colored brick with white stone trimmings. The stone is only used for sills and for the posts and lintel of the porch, the other details being of brick.

This house was built two years ago, and is the first example of diaper pattern in brick in the city, although it has since been introduced in several residences. The brick forming the pattern project about one fourth-inch from the wall,

HOUSE ON PENNSYLVANIA AVENUE, DENVER.
F. E. KIDDER, ARCHITECT.

and are of a slightly darker shade than the ground. The roof of the tower or third story does not connect with the loggia roof on the side, as might be supposed from the photograph, but is separated from it by about six feet of roof. A detail is given of the main cornice, which



should have been of terra-cotta, but the architect was obliged to construct it of wood, which is painted to match the stone work. The house is constructed of plain eight-inch brick, no moulded brick being employed.

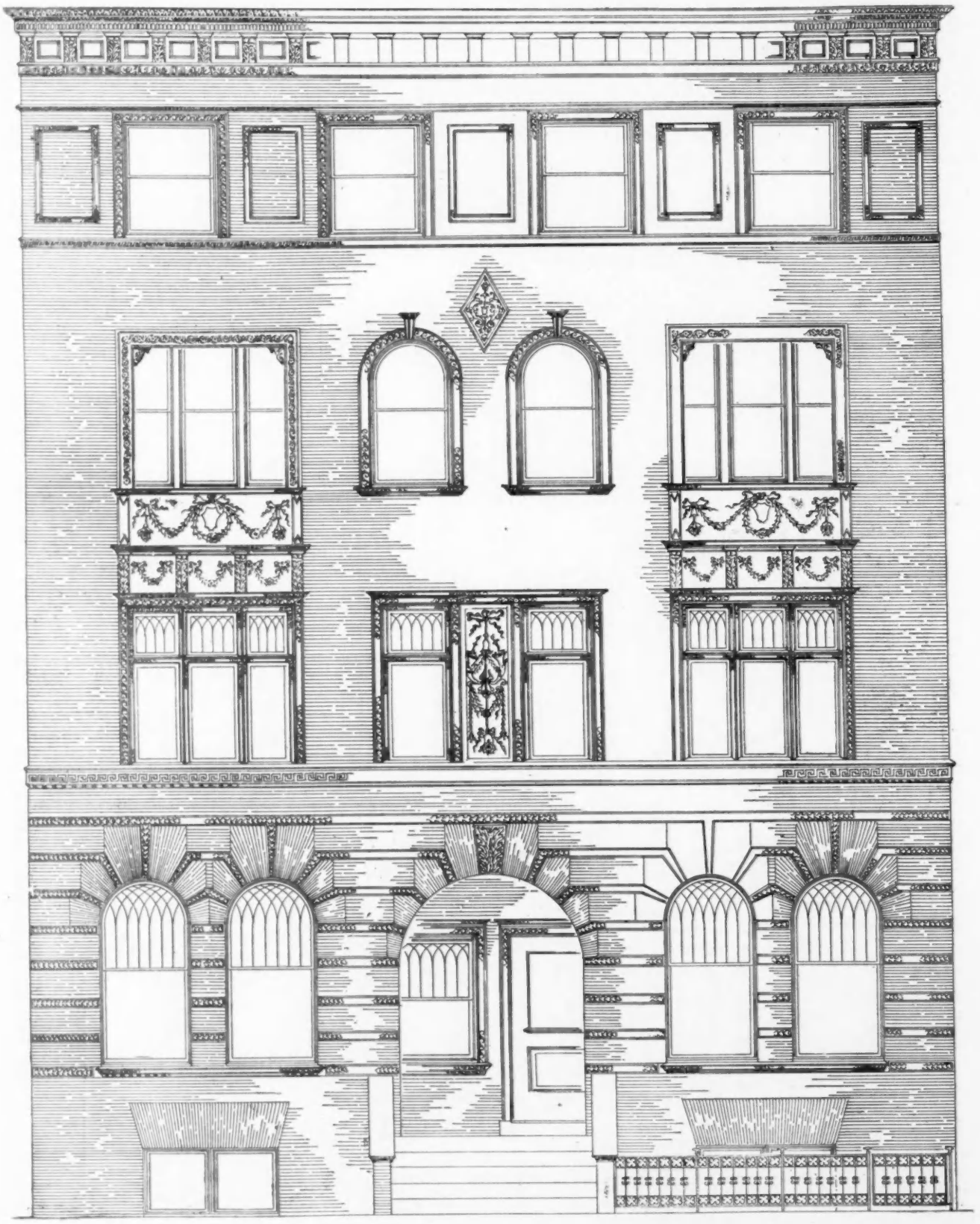
One of the disadvantages under which the Denver architects labor is the lack of moulded brick of artistic designs. But very few shapes of moulded brick are carried in stock by the Denver manufacturers, and not more than half of these are desirable patterns. Special patterns can be made to order, but this requires more time

WORTHY BUILDING, MAIN AND WORTHINGTON STREETS, SPRINGFIELD, MASS.

GARDNER, PYNE & GARDNER, ARCHITECTS, SPRINGFIELD.

FRONT BRICK BY EASTERN HYDRAULIC-PRESS BRICK CO., PHILADELPHIA.

TERRA-COTTA AND POROUS TERRA-COTTA FIREPROOFING BY FISKE, HOMES & CO., BOSTON.



BRICKBUILDER COMPETITION FOR A CITY HOUSE.

First Prize, Louis Sonntag, Philadelphia. Elevation at a scale of three sixteenths of an inch.

BRICKBUILDER COMPETITION FOR A CITY HOUSE.

Plans at a scale of one sixteenth of an inch.

FIRST PRIZE, LOUIS SONNTAG, PHILADELPHIA.

The general shape of the plan was adopted as giving direct and better light in every room than could be obtained in any other way that occurred. It is not thought that the light-well in position shown isolates the apartments in either wing in a way that will prove unhandy in any way. Large rooms are provided rather than a greater number of rooms of a smaller size. Dressing-rooms have been provided in connection with all the principal bedrooms wherever it was possible without cutting into the bedrooms and reducing their size. In a house of this size they are found to be a great convenience. The hall in the upper stories of the parlor side of the house is intended to be lighted by transoms over the doors opening into it, and by sash placed high up in the central bed-room partition. The outside vestibule was adopted, as it was thought that there could be no serious objection to the vestibule in common between the two houses, and it allowed of the placing of a central opening in the elevation, which tends to make the house keep its indentity as one house, and yet not look wrong as two houses when altered with two doors in vestibule. The central brick wall was embodied, as the introduction of a party wall, in the event of alteration, would be rather an expensive alteration. As few openings as are possible were put in same, and they are intended to be arched over and finished square.

The front is intended to be faced with two shades of Pompeiian brick, Roman size, the darker shade to be used up to the second-story sill line, and the lighter shade for everything above. The terra-cotta to match the bricks where it occurs. The cornice is intended to have about three feet projection.

Height of Floors. — Basement, 9 feet; 1st floor, 12 feet; 2d floor, 11 feet; 3d floor, 10 feet; and 4th floor, 9 feet 6 inches.

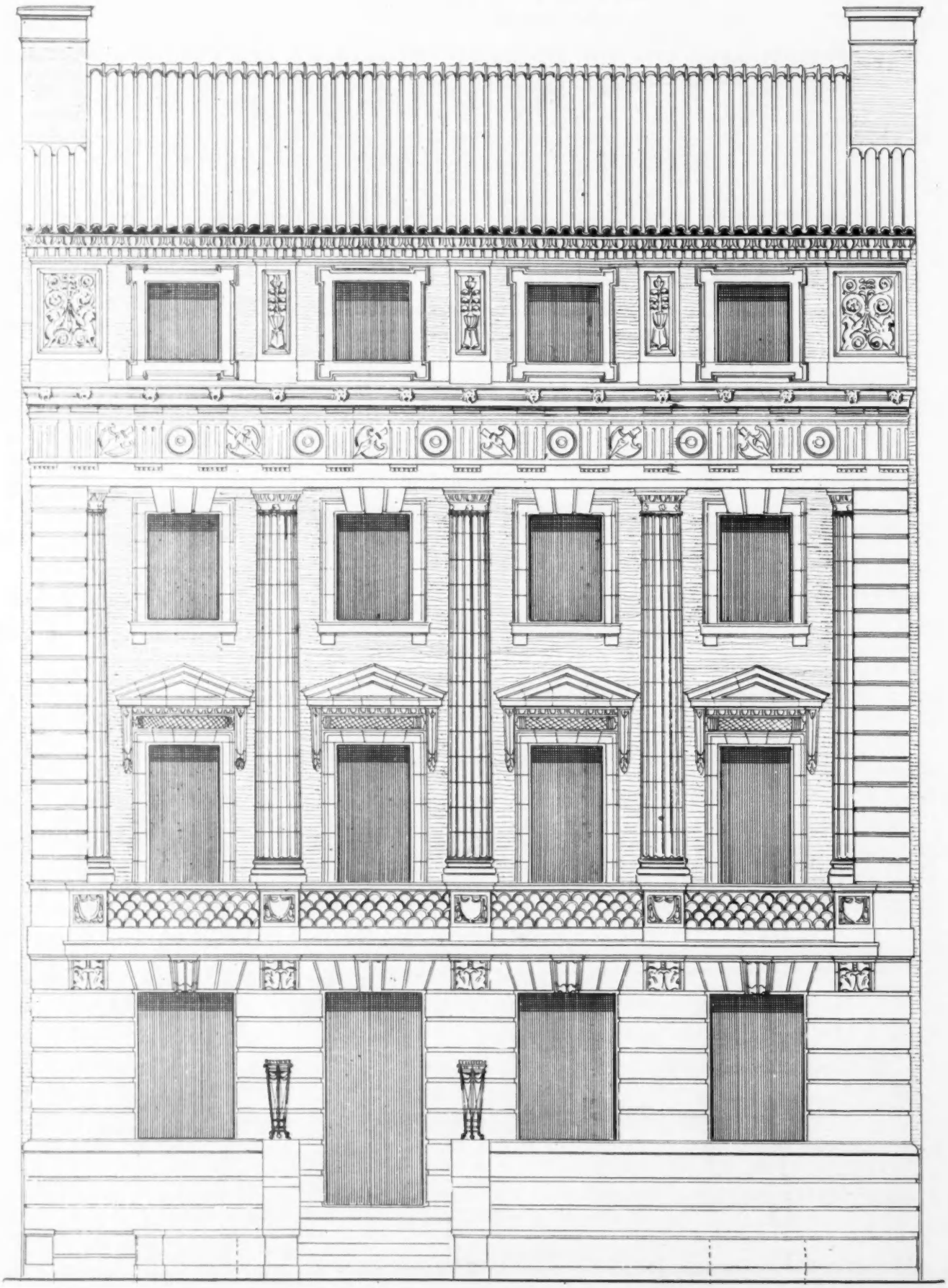
The following alterations would make two houses complete in all particulars: —

Partitions to be added or altered and stair built to make the parlor side of the house the duplicate of the present stair side hall, reception-room, and entrance hall, and a pantry and rear stairs could be built in the space now occupied by the smoking-room. The library changed to a dining-room. The stair hall side of the house would be complete as one house when the openings in the central brick wall were closed up, with the exception of a bath-room which could be placed in the space now occupied by the linen-closet and dressing-room, adjoining on the second floor. The vestibule in front of the house could be divided by a light iron railing, and the window cut down and made a front entrance door.'

In the upper stories the introduction of the main stairway in parlor side of the house would alter the shape of the central bedrooms in the second and third floors to that of the one over the present stair hall in second story. The rear stairway would take the space now occupied by the dressing-room and closets to the central bedroom in second and third stories. The second story rear bed-rooms would probably be taken for a sitting-room in each side of the house.

The billiard-room in the fourth floor need not be disturbed unless the space is needed for bed-rooms; and the play-room and storeroom altered to make a bath-room and bedrooms for servants.

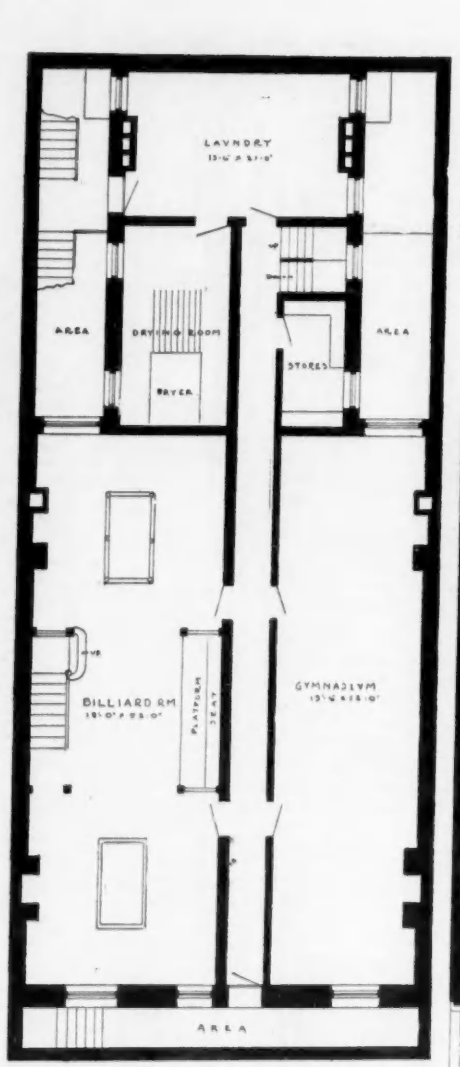
In the basement the laundry would be turned into a kitchen, and laundry taken out of cellar space. Access to cellar from front street, if needed, could be arranged as shown on other side of house.



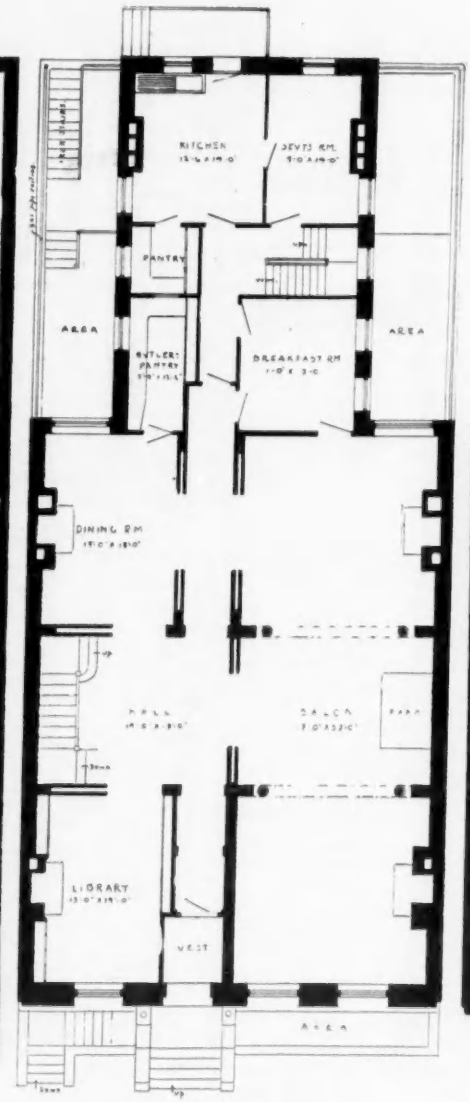
BRICKBUILDER COMPETITION FOR A CITY HOUSE.

SECOND PRIZE, JAMES C. GREEN, ST. LOUIS, MO.

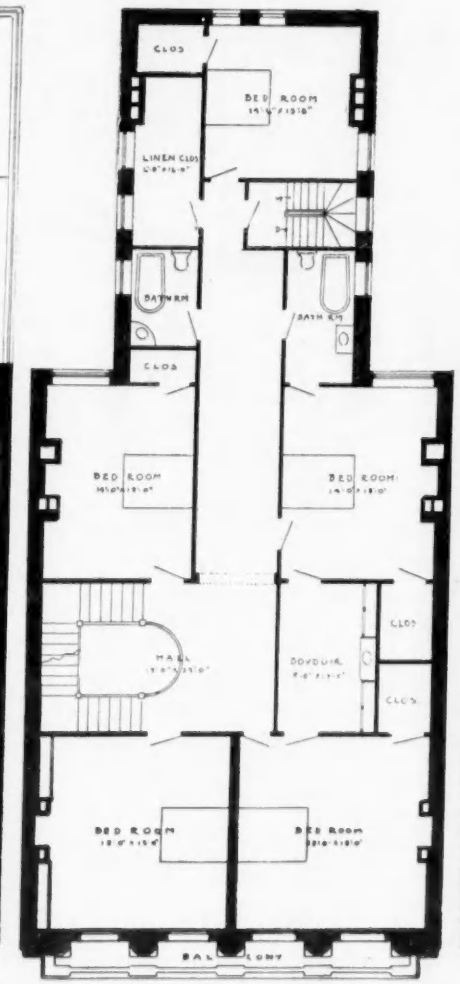
Elevation at a scale of three sixteenths of an inch.



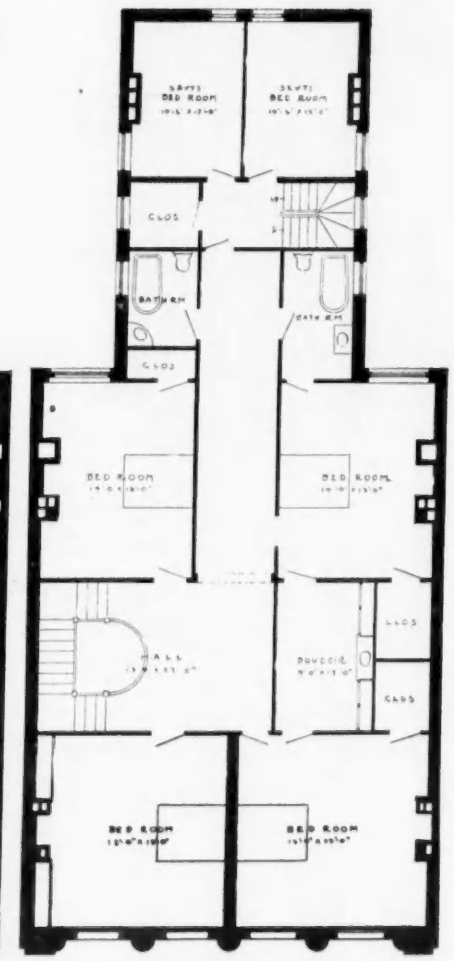
BASEMENT PLAN.



FIRST FLOOR PLAN.



SECOND FLOOR PLAN.

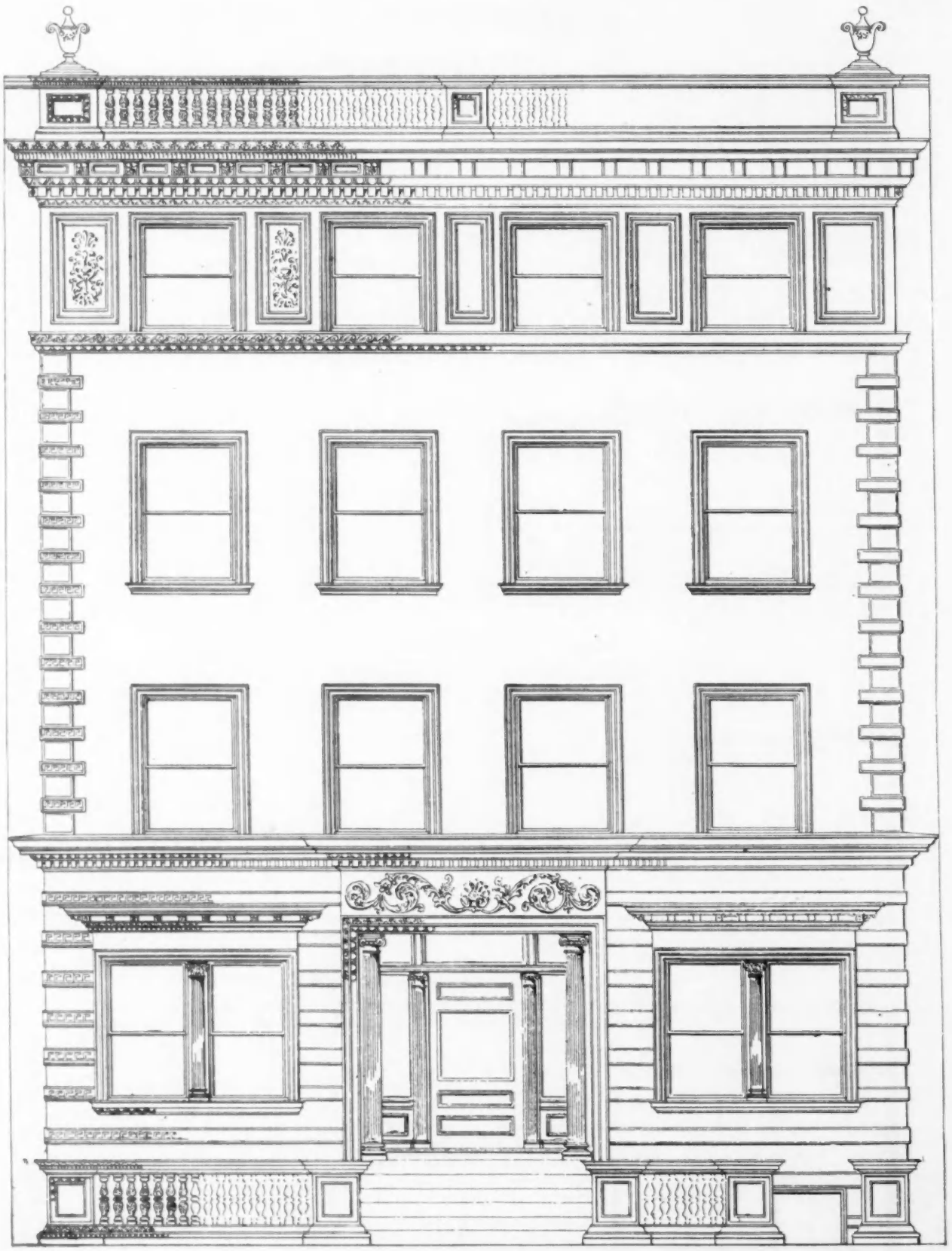


THIRD FLOOR PLAN.

BRICKBUILDER COMPETITION FOR A CITY HOUSE.

[1] SECOND PRIZE, JAMES C. GREEN, ST. LOUIS, MO.

Plans at a scale of one sixteenth of an inch.



FRONT ELEVATION.

BRICKBUILDER COMPETITION FOR A CITY HOUSE

THIRD PRIZE, E. S. WESTER, BOSTON.

Elevation at a scale of three sixteenths of an inch.

BRICKBUILDER COMPETITION FOR A CITY HOUSE.

THIRD PRIZE, E. S. WESTER, BOSTON.

Plans at a scale of one sixteenth of an inch.

PLANS. — In the cellar the party wall would be carried the whole length of the house, and up to the basement floor, so that it would only be necessary to build from that floor to roof, with the exception of the wall that shows on present plan.

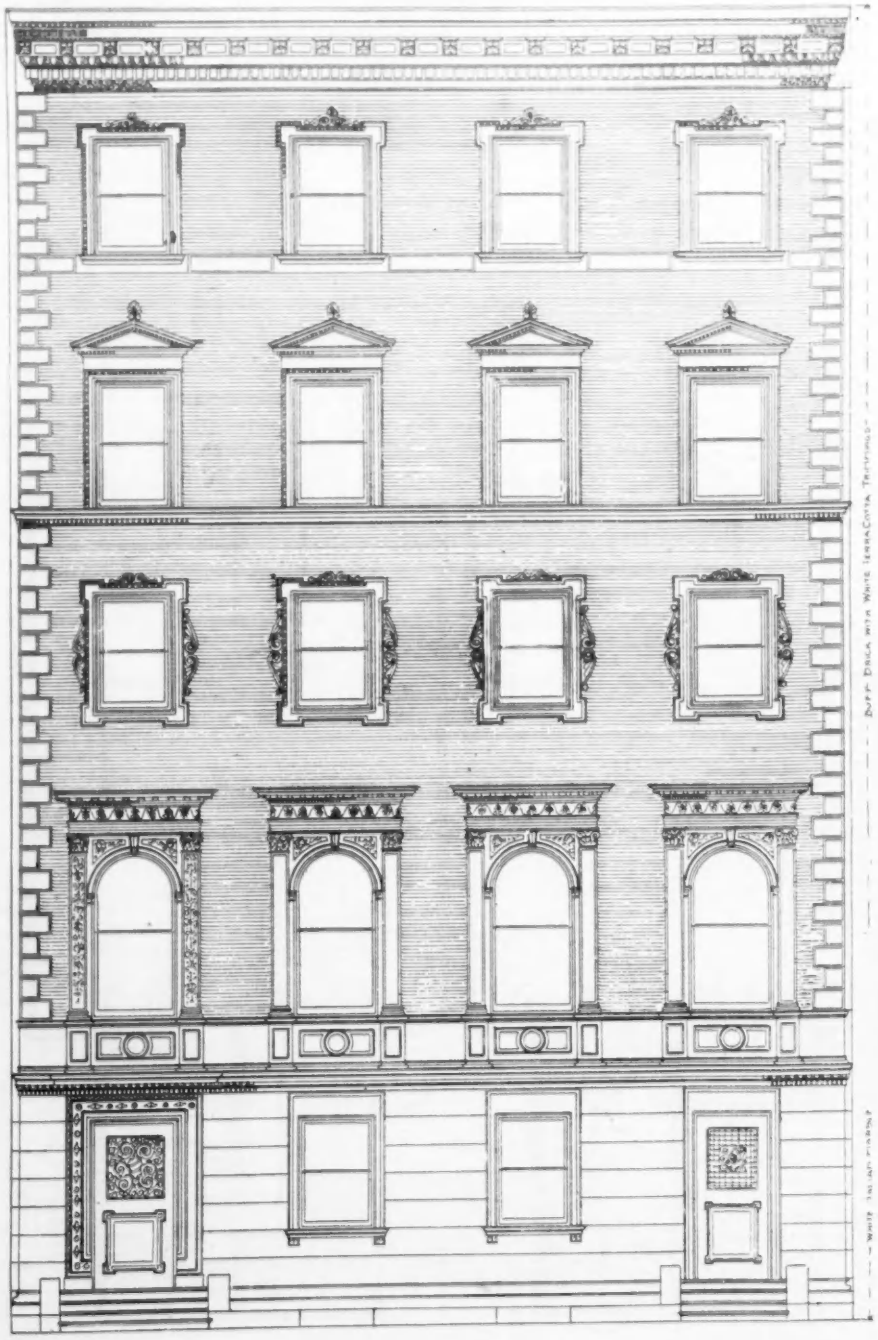
Basement. — For a double house make the servants' dining-room the laundry, leaving the chamber and bathroom the same. A few feet would have to be taken off of the sitting-room for passage to the area, changing the sitting-room to a chamber.

First Floor. — Besides the party wall there would simply be a few partitions to put in music-room, same as on opposite side of house. In the front hall the fireplace would have to be taken out and replaced by front stairs. This would give a kitchen, dining-room, reception hall, and parlor in each house. For the front entrance run the party wall as far as vestibule and from there out to be a panelled partition which would end into a column placed between the columns that are now on plans.

Second, Third, and Fourth Floors. — On these floors it would only be the putting in of bath-room, back and front stairs. The front chambers of second floor change into sitting-rooms. On the fourth floor, by carrying the front hall through, would make both front rooms same size as present chamber. These make into billiard-rooms by taking away closets and wash bowls.

Front. — For the front have first story of terra-cotta, and from belt under fourth-story windows up to be of same. The intermediate stories fill in with common brick (except columns and architraves, which would be of terra-cotta) laid in white mortar, Flemish bond. To give the appearance of a double house run a balustrade in the centre of present entrance with a post on the end, to be same as the one around areas. By putting a column in the centre of present entrance and running a panelled partition back to the party wall, which would make the two required entrances.

THE BRICKBUILDER.



Elevation at one eighth inch scale.

Plans at one sixteenth inch scale.

For additional plans and description of changes see page 132.

BRICKBUILDER COMPETITION FOR A CITY HOUSE.

FOURTH PRIZE, GILBERT F. CRUMP, ROCHESTER, N. Y.

RESIDENCE ON FRANKLIN STREET, DENVER. J. G. LINK, ARCHITECT.

than can usually be given, and, unless a large number of an especial pattern is wanted, the cost is prohibitory. In none of the buildings illustrated in this article are moulded bricks used.

One of the best examples to be found in the city of a low-cost brick residence is the Franklin Street house, shown by a photograph, which was designed by Mr. J. G. Link. This house probably cost about four thousand dollars; it is built of a pinkish-colored brick, with very light-pink stone trimmings. The diaper is picked out by brick of a darker shade, which are set flush with the wall. The roof is shingled, and stained a moss green.

As may be judged from the illustrations that have been given, the present prevailing style of cornice for residences is that of the overhanging eaves, with sawed rafter ends, the projection varying from three to four feet.

There are a few examples of colonial residences, but these have mostly wooden trimmings and details, and only differ from wooden houses in having brick walls instead of frame. In many of these houses the brick has been painted yellow, so that the effect at a distance is about the same as that of a wooden house.

Although this is not generally considered proper treatment for a brick building, these houses form an agreeable contrast to the mass of red brick buildings, and, as the architects could not build of wood, they did the only thing possible, considering the limit of cost, to obtain the desired effect; and, after all, a painted brick wall is much drier and more enduring than one not painted. Probably a large proportion of the brick buildings built before pressed brick were obtainable will be treated in this way before many years.

At present there are only about half a dozen houses being erected, and there are very few on the boards, owing to the general business depression which has greatly affected building operations, so that the architects here have been practically idle for nearly a year.

With the revival of building, for it is to be hoped that it will revive, the Renaissance will probably be the prevailing style as far as it can be followed with the materials at hand. There has been a tendency within the past year to use cement and *carton-pierre* for panels and ornaments, following the example of the World's Fair buildings. In the few buidings in which these materials have been used, they have withstood the action of the weather satisfactorily, and they appear to be well suited to our climate. An example of this class of work will be given in another communication. E.

THE WORTHY BUILDING, SPRINGFIELD, MASS.

MESSRS. GARDNER, PYNE & GARDNER are the architects of this building (see Plate 49), which stands on the corner of Main and Worthington Streets, having a frontage of 48 feet on the former and 139 feet on the latter. It will be used for hotel purposes, and is fire-proofed throughout with material made by the Staten Island Terra-Cotta Lumber Co., supplied through Fiske, Homes & Co. of Boston, who also furnish the outside terra-cotta for window trimmings and belt courses, in a medium shade of their fire-flashed line of terra-cotta. The exterior walls are of Eastern Hydraulic Press Brick, shade number 210. Brownstone and Milford granite are used for the stone work. This building replaces the hotel destroyed by fire last fall, and the proprietor, Mr. Worthy, has taken every care that his new hotel will be absolutely safe.

THE BRICKBUILDER COMPETITION FOR A CITY HOUSE.

ALL of the plates of this number, with one exception, are devoted to the first four prize designs in this competition. A brief statement of the programme, which was published in full in the April number, will serve to make the plates clearer.

It was supposed that the owner of a forty-foot city lot in New York City wished to build a fine residence so planned and designed that should he ever wish to sell the property it could be made into two twenty-foot houses by a few comparatively small alterations, thus enabling him to make a readier sale and realize a larger price.

The designs, twenty-six in number, were submitted to a jury consisting of Messrs. Robert D. Andrews, George H. Wetherell, and Herbert Jacques, who selected the designs here published, as the four best. In a later number we will publish the fifth and sixth prize designs, by Edwin R. Clark of Lowell, Mass., and J. Mills Platt of Rochester, N. Y. Below we give the explanatory notes accompanying the fourth design by Gilbert F. Crump of Rochester, N. Y.; and also publish on this page his second and third floor plans.

List of alterations in the plans of design marked "Capital" in order to make two houses twenty feet wide: —

Cellar. Adapt plan "A" to plan "B" in every respect. Place one of the two heaters of plan "B" in storeroom of plan "A," and close opening in party wall.

Basement. Adapt plan "A" to plan "B" in every respect, removing laundry tubs to kitchen. Build up party wall in kitchen and close all openings in same.

First floor. Build party wall through hall, sitting and dining rooms; close up opening in same. Adapt plan "A" to plan "B" in regards stairs, butler's pantry, and toilet-room. Build fireplaces in dining and sitting rooms.

Second floor. Build party wall through library and own rooms, and close all openings in same; then adapt plan "A" to plan "B." Build fireplace in library and own rooms.

Third floor. Build party wall through billiard-room and close openings in same. Adapt plan "A" to plan "B," and build fireplace in billiard-room.

Fourth floor. Close up openings in party wall; then adapt plan "A" to plan "B."

FOURTH PRIZE DESIGN, COMPETITION FOR CITY HOUSE.
For elevation and other plans see Plate 56.

A GEM FROM RUSKIN.

AND here let me pause for a moment to note what one should have thought was well enough known in England, — yet I could not, perhaps, touch upon anything less considered, — the real use of brick. Our fields of good clay were never given us to be made into oblong morsels of one size. They were given us that we might play with them, and that men who could not handle a chisel might knead out of them some expression of human thought. In the ancient architecture of the clay districts of Italy, every possible adaptation of the material is found exemplified; from the coarsest and most brittle kinds, used in the mass of the structure, to brick for arches and plinths, cast in the most perfect curves, and of almost every size, strength, and hardness; and moulded bricks, wrought into flower-work and tracery as fine as raised patterns upon china. And, just as many of the finest works of the Italian sculptors were executed in porcelain, many of the best thoughts of their architects are expressed in brick, or in the softer material of terra-cotta; and if this were so in Italy, where there is not one city from whose towers we may not descry the blue outline of Alp or Apennine, everlasting quarries of granite or marble, how much more ought it to be so among the fields of England! I believe that the best academy for her architects, for some half-century to come, would be the brick-field; for of this they may rest assured, that till they know how to use clay, they will never know how to use marble. — *Stones of Venice*.

FOR some time we have refrained from publishing, as has been our wont, the letters received from subscribers complimenting our publication. We could, however, publish a neat little volume made up of such.

The fact that in the six months ending July 1 our paid subscriptions have more than doubled is quite in evidence that our efforts are appreciated.

THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

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PUBLISHERS' STATEMENT.

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FEW architects realize what a difference in cost intelligence in terra-cotta designing makes. Here our habit of designing on paper shows one of its weakest points. Draughtsmen make pretty drawings of the various accepted ornamental motives, judging the design by the lines before them, forgetting that the drawing is only a tool used in the execution of the work. As such it must be made with the most thorough knowledge of the material to be used and the methods of working it. Every material has certain limitations. To go beyond these involves extra expense in working, and produces an unnatural result that at once forces itself upon the attention of one intimate with the material.

The question of cost is an important one, and will demand consideration where objections on an æsthetic score are unheeded. In terra-cotta work a designer, knowing the character of his material, will produce at considerably lower cost results that are vastly more effective than those of a designer who knows materials only as they are indicated by a wash, or labelled, on the paper before him.

He knows how the pieces will be modelled, how joined, and in what shape they stand least in danger of warping while burning. He governs his detailing by these characteristics, and the manufacturer has a straightforward, intelligent piece of work to figure on. He knows exactly where he will come out; his factor of uncertainty is a proportionately small one.

Take, on the other hand, a design which absolutely ignores the character of the material, and involves in its execution a large element of risk. This risk is a factor in the estimate, and is often so large as to add thousands of dollars to what the cost should be for practically the same work intelligently designed. Any practical terra-cotta maker can give the average architects points on terra-cotta designing that will save his clients money, and enable him to make his work proportionately more effective. There are few manufacturers who would not gladly devote time to showing an architect those details of manufacture which had a bearing upon the designing of terra-cotta work. We have made arrangements for some articles upon the detailing of terra-cotta work, but their value will be insignificant as compared with a few hours at some well-managed factory in company with a man who knows the practical part of the business.

INSTANCES have recently come to our attention which would seem to give material-men considerable ground for complaint against some architects for decidedly unfair treatment. We cannot see the justice of allowing manufacturers to figure on work and put in bids, which, on their part, is done in all earnestness, when the architect has made up his mind not to give them the contract if they are the successful bidder. One of the most aggravating and yet most common instances of dishonorable practice is that of allowing several manufacturers to estimate with a view to using the lowest estimates to beat down one of the bidders whom the architect wants to have do the work, yet whose initial bid is apt to be above the average. It is usually done by taking the lowest bid to the selected bidder and telling him he can have the job if he will meet the successful bid. We say it is dishonorable because it is dishonest practice. The taking off of quantities and the figuring of costs is no little item in the time of the manufacturer or his agent. He invests this time as a part of his expenses in securing business. The architect who takes his time, having decided not to give him the contract, is a *thief*, for no material-man will estimate unless he thinks he will get the contract if his bid is the lowest. He certainly would not work hard for hours preparing an estimate which he knew would be used only to beat down a competitor.

The architect may give as his excuse that he was not satisfied that the lowest bidder could satisfactorily fill the contract. The only answer to this is that he should satisfy himself beforehand that none but responsible bidders were allowed to figure. It is a characteristic of the best offices that the figuring is not thrown open to Tom, Dick, and Harry, but to a list of reputable contractors and material-men. The architect who "turns down" the would-be bidders frankly, because he has doubts as to their satisfactorily carrying out the contract, is far more honorable and aboveboard than he who allows every one to figure because he dislikes to shut out certain ones.

THE manufacturing town of Hudson, Mass., has just had a conflagration that enables it to practically begin again. It was one of those towns of long and slow growth, containing many wooden structures. The business men have at once taken steps to rebuild, and have adopted the wise plan of acting together, sacrificing individual interests to those of the community. It is gratifying to us to note the no uncertain stand the business men have taken, almost to a unit, that the new buildings must be brick, and that frame structures will not be allowed within the limits of the business centre. Such buildings need not be fireproof in the sense that our steel skeleton hollow tile office buildings are fireproof. But with slightly increased expense, and with intelligent planning and construction, the new buildings of Hudson may be made so fire resisting as to burn slowly when they do catch fire, and to restrict the fire to the room it originates in long enough to allow the fire department to get to work. Wooden joists may be protected very efficiently by slabs of porous terra-cotta, or, as it is sometimes called, terra-cotta lumber, — a material which can be sawed and fitted like ordinary lumber, and securely nailed to the studding or joists it is to protect. Wire lathing gives a similar protection, and has shown by tests that it will hold a hot fire from a half to three quarters of an hour without giving way. Ordinary wood lathing almost

immediately fails, and at the ceiling too, the plastering falling and exposing the joists to the fire beneath. There are numerous methods of construction that retard the progress of fire and yet cost but a little more than the most inflammable kind of construction. It seems to us that one of the first duties of the citizens of Hudson is the framing of a set of safe building laws, and the appointment of an able inspector to see that they are followed.

A CITY architect is a good thing for a city when a good man fills the place, but it is a dangerous office to create unless there is a tolerably fair certainty that plenty of good men will be available. Brilliant as has been Mr. Wheelwright's success as occupant of the office under Mayor Matthews, think of what that office was in the years leading up to his appointment, and think what it may be next year, when he retires. The patronage connected with the building operations of a large city is too strong a temptation to the average politician to be resisted. It needs the strongest kind of a man to keep the line drawn at anything in the nature of corrupt practices. We hear Milwaukee wants such an office, and the architects there are canvassing the pros and cons. If they want our advice it is brief, "*Don't.*"

FOLLOWING upon the recent labor disturbances in the West, the successful arbitration over a reduction of bricklayers' wages, between the Mason Builders' Association and Bricklayers' Union No. 3 of Boston, is a hopeful sign that in some portions of the country disagreement between employer and employee is coming down to a logical and civilized basis of settlement. Arbitration when used as "an ounce of prevention," as Secretary Sayward aptly puts it, fills its only proper place. If it is at all applicable, it certainly should come in as a preventive, and not as an adjuster of disagreements. In the case in question, the form prepared by the National Association of Builders was followed. This form recognizes two sides to every question, and that the two sides must be heard before a just opinion can be formed. It provides for a committee of not less than six members, equally divided between the associations represented, and an umpire, who is neither a journeyman craftsman nor an employer of journeymen. The full form may be obtained by applying to Secretary Sayward at the Boston Exchange.

The full report of the umpire, Mr. William Lloyd Garrison, is so well worth the attention of every employer of labor that we publish it in the Manufacturers' Department of this issue.

THE editorial request for opinions on the Roman-shape common brick in our last issue brought us a good many expressions, mostly favorable, from architects. Extracts from these are published in the Manufacturers' Department.

WITH the establishing of a Technical Training School for teaching the manufacture of materials from clay at Columbus, Ohio, the first of its kind in the country, a long stride has been taken in the advancement of scientific brickmaking.

THE selection of Mr. Edward Orton, Jr., to be at the head of the new training school at Columbus, Ohio, is a fitting tribute to a very able young man, and will do much toward establishing confidence among the brick manufacturers of the country, with whom Mr. Orton has an extensive acquaintance.

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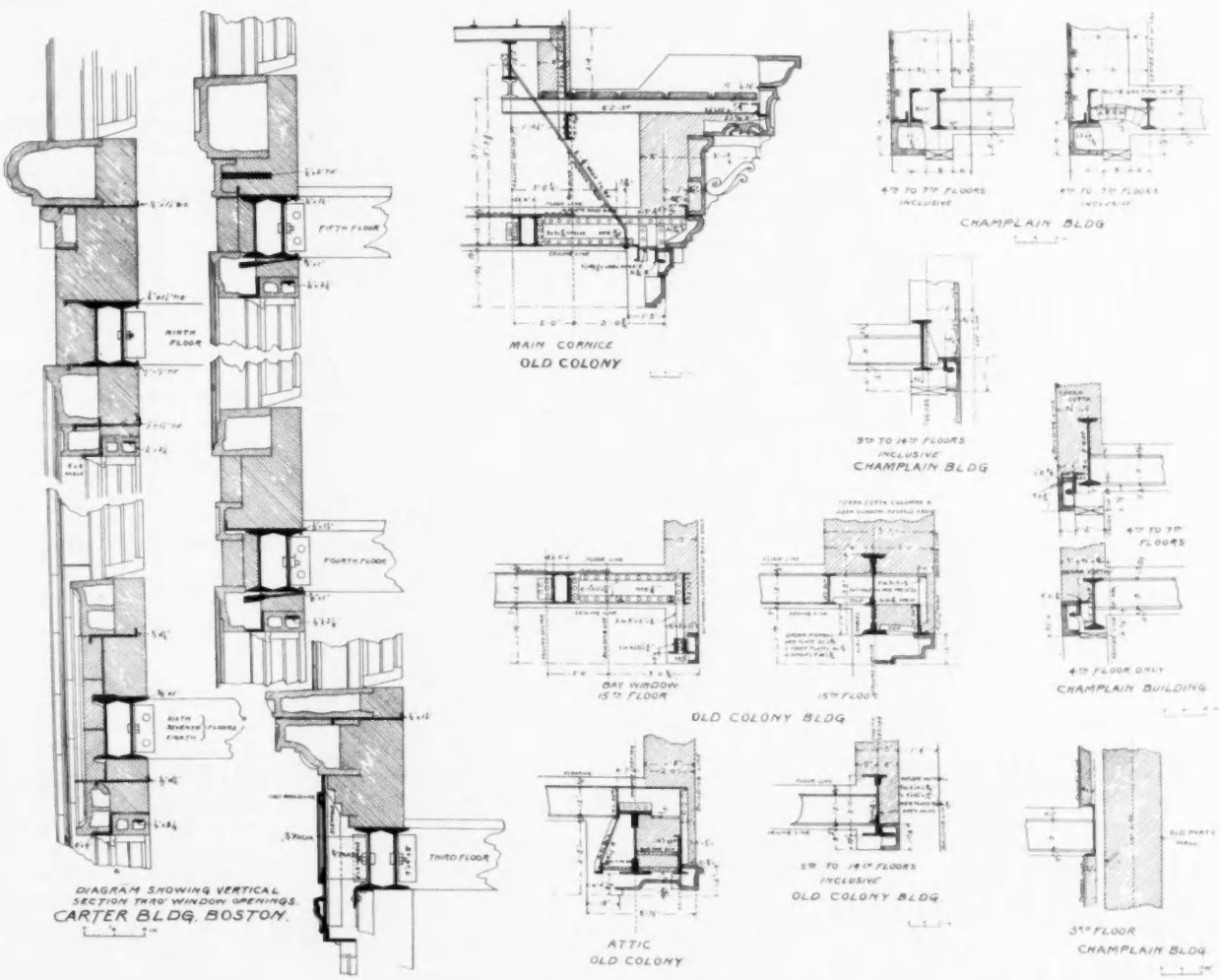

NOTE. — In the above diagrams, the Carter Building sections are reproduced at a scale of three eighths of an inch; the Old Colony Building, three sixteenths of an inch; and the Champlain Building, one quarter of an inch.

TERRA-COTTA IN SKELETON CONSTRUCTION.

(Continued from May number.)

THROUGH the courtesy of Mr. C. H. Blackall, architect, Boston, we can see in this issue of THE BRICKBUILDER details of the wall construction of the Carter Building. It is profitable to note what Mr. Blackall says concerning this construction: "I would make a change if I were to do the work over again. You will notice that the outer four inches of the work is practically borne by the corbelling above the beams of the third floor. The face work is tied into the back very thoroughly with galvanized iron ties; still, another time I would carry the constructive steel of each story out to within two or three inches of the front." This is certainly correct.

An important principle in skeleton construction is to support the masonry at every story, thus making the difference of expansion and contraction between steel and masonry imperceptible. It is probably true in the Carter Building that the masonry is carried story by story, being virtually corbelled out from the beams at each floor (otherwise one might expect to find shearing cracks between facing and backing), and it would surely be better, as Mr. Blackall says, to bring these supporting beams within three inches of the building line. It would seem also that the fireproofing of these beams is faulty. The heads of windows are subjected to the greatest heat in a fire affecting exterior walls, and the construction in this case is such apparently that the protecting tiles would soon drop and leave the beams unprotected.

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We are indebted to Messrs. Holabird and Roche for the details of the Champlain and the Old Colony, two of their latest buildings in Chicago. These sections are selected to show how varying conditions were met and problems solved in particular cases, and are submitted as being valuable for reference.

The detail marked "Bay-window 15th Floor" shows a construction which has been used frequently in Chicago, but which seems undesirable when it can be avoided. The great leverage on the rivets seems to make it impracticable to obtain the proper rigidity. Whether the cause be poor workmanship leaving rivets loose, or whether mistakes have been made in calculations and deflection followed, at any rate in several instances, in other buildings where this construction has been used for bay-windows, the masonry shows cracks. This leads to the observation that the anchorage of the masonry, particularly the terra-cotta, to the steel should be most thoroughly done. As Mr. Shankland, engineer of the firm of D. H. Burnham & Co., remarked to the writer, "The anchorage of terra-cotta to the constructional steel cannot be shown on the drawings except in a general way, and it should be made a matter of strict superintendence."

The proper anchorage of masonry veneering to the supporting steel is certainly a vital matter in skeleton construction, and solid, heavy wall advocates will have a good case in the future if this is neglected and as carelessly done as it is to be feared has been done in some buildings. An instance is known where a whole section of wall facing on the court side of a high building fell off, all because the workmen omitted the anchors. D. EVERETT WAID.

RESIDENCE OF JOHN H. INMAN, NEW YORK.

Fireproofed by The Lorillard Brick Co., New York.

FIREPROOFING OF MERCANTILE BUILDINGS.

THE problem of the modern fireproof office building has in a general way been completely solved. The cheapest and most logical form of construction for such a building has been found to be the nearest perfection in the matter of fireproofing; but it is not in buildings used for office purposes that the greatest risk of fire occurs. The finish and general character of an office building demand constructive work that cannot be essentially cheapened by building without regard to fire protection. Necessary as it is to have buildings of this class thoroughly fireproof, it is far more important to have those structures of a cheaper and rougher character as perfectly fireproof as present knowledge of construction will make them. These buildings are devoted largely to small manufacturing enterprises or to a jobbing business, and a large percentage of their space is occupied by stock which is almost always more inflammable than the building itself. The wholesale and jobbing sections of our large cities show miles of streets lined with buildings that are a constant menace to the mercantile and manufacturing interests which occupy them. These buildings have exterior walls of brick, and in some cases partition walls that extend from cellar to roof. The floors are composed of ordinary joists set with short distances between the centres and floored with one or two thicknesses of common board. The under side of these joists is left unprotected, and if fire ever starts in the piles of merchandise stored in these buildings, it is well-nigh impossible to save them, or keep the fire from spreading to adjoining structures. There are many new buildings now being erected in our principal cities which are to be devoted to small manufacturing, jobbing, or storage business. These buildings externally are models as examples of architecture; in fact, the most logical, consistent architectural work in the country is to be found in this class of buildings. They render the business sections considerably more interesting than any other to the student of modern architecture. If their interior constructiton were as well carried out as their exterior design, they would be above criticism. What is most needed is a cheap but thoroughly effective method of rendering the interiors fireproof. In the case of a building which is devoted to several businesses, the construction should be such that a fire originating in the portion occupied by any one business could not spread beyond the space occupied by that business. We believe that the increased rents that could be secured for business premises of this character would more than pay for the increased investment necessary for their construction. We would very much like to have architects who have had experience in the construction of such buildings favor us with some notes as to the method of construction and its cost.

A FIREPROOF RESIDENCE.

WE give on this page a photographic reproduction of the residence of John H. Inman, Esq., in New York City. This is one of the comparatively few New York residences built with fireproof construction. We are indebted for the photograph to Lorillard Brick Works Company of 92 Liberty Street, New York, whose terra-cotta fireproofing materials were employed in its construction. Although the risk of serious conflagration in residences is slight, still the added amount necessary to make them fireproof is proportionately so small that the feeling of security in such a residence is obtained at little expense.

The progress in the manufacture of cements has brought concrete into the first rank of importance in engineering works; and as the grades of cement multiply, and concrete comes more and more into use, it becomes a matter of duty with every engineer and architect, who pretends to be a professional man, to make himself familiar with the various brands of cements and their relative values in practical work.

The manufacture of concrete is more of an art than most people suppose. It involves a knowledge of the qualities and nature of cements, of the relative value of aggregates, of the proportions of ingredients for various purposes, of the numerous methods of re-enforcing in order to secure the full working value of the materials, and in fact it is a department of engineering by itself and demands special training as much as does iron construction or stone masonry.

Concrete is one of the most reliable of all materials with which we have to deal. If it is treated properly, it will never fail of its duty. In the first place the manufacture of concrete involves honesty; and if that is not to be had in those who do the work, the remedy is to be found in the ability of the architect to specify and direct his own construction. The architect must know what is proper, and insist upon his ideas being carried out. One grade of cement is not as good as another, even if it is marked "Portland" and has the same market value. One grade of stone is not as good as another, even though it be "clean and free from dust."

The lack of knowledge and the indifference of architects and engineers are responsible for the poor concrete that we hear about. Use proper materials in a proper fashion and there will not be so much said about its inability to withstand frost or the weather or fire or the sea. Concrete, when properly made, has demonstrated that it is just as serviceable in New York as in San Francisco. It will endure as long in Minnesota and Halifax as in New Orleans and Florida.

There is not a terra-cotta tile floor on the Continent of Europe. The great submarine works of England and France tell of its value in docks and marine masonry. But such work demanded care and watchfulness, integrity and skill, a knowledge of the behavior of cements and their relative values in the various capacities in which they were used. Concrete for floors is a very different material than a concrete for foundations; and the building of a weather wall requires a specification essentially different from that used in the laying of subways and conduits.

It is hoped that as the use of concrete comes more and more into favor, that those engaged in the building professions will realize the necessity of rigid specifications and correct management in the handling of concrete, that this splendid material may be more fully developed, and its many virtues more thoroughly realized.

III.

It is a common practice in mortar making to use more or less cement with the lime. It would be valuable to have some reliable testimony regarding what seems to be a rather questionable method of improving common mortar. Surely the mortar that is used in our construction these days is poor enough, but it is uncertain whether the use of cement in limited quantities is of any value in bolstering it up.

There is no reason for such abominable stuff as goes into our floors and wall work, and it is not surprising to see the bricks come out of a wall as clean as the day they were made. We have most excellent bricks, and if the quality of the mortar were equally as good, it would require considerable more trouble to pull a wall down than is involved at present. Cleaning bricks is a simple matter in Boston.

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LIMES AND CEMENTS,

MORTARS AND MORTAR COLORS.

A REVIEW OF VARIOUS METHODS OF CONCRETE CONSTRUCTION AS APPLIED IN ENGINEERING WORKS.

I.

THE translation and publication of Choisy's valuable work on "Roman Construction" by Mr. Arthur Dillon comes at a most favorable time, in view of the increasing interest being taken at present in concrete and the use of cement by professional builders.

Viewed as a technical work for reference in practical construction its value is small, inasmuch as the progress in the mechanics arts, in the manufacture and use of cements and the manipulation of concrete, has rendered the Roman methods obsolete and uneconomical, although at the time of their development their very existence was called into being by the demands for economies in labor and materials.

The "Roman Construction" is of especial interest, however, as a means of comparison of the stages of progress made in building from ancient times; the Roman work being a sort of zero mark from which we may start in tracing the development of cements and concrete.

However radically we may find the Roman methods to differ from our own, the principle underlying all is the same. The chemical union of certain compounds which forms the basis of the hardening of cement is the property of the Romans, and subsequent work has resulted merely in the perfecting of a principle which they were the first to use to any great extent.

It is true that we know of mortars and concretes that antedate Roman work fully two thousand years; but although these ancient specimens are real concretes, they were rather the result of accident than of art, and but small traces are found of them. The oldest is from Cyprus,* an exceedingly hard and firm lime concrete from the Temple of Larnaca; another is from the Great Pyramid, and is composed largely of a sulphate of lime; while a third is from the Greek Temple of Pentelicus in Athens, and is a real lime and sand mortar, so old that the union of the silica and lime has taken place, forming a very strong, hard stone.

The composition of all is the same as far as the union of the elementary substances is concerned. Lime, silica, and alumina in varying proportions form the basis of all cements, ancient and modern.

* Journal Franklin Institute, Vol. LXXIX., Wm. Wallace, Ph. D., etc.

When nascent lime (CaO) is brought into contact with free or soluble silica, the result is a chemical union. It may be accomplished slowly by mixing fresh burned lime with certain kinds of sand, or by burning lime and clay (silica and alumina) together in properly constructed kilns. The first-named process was that used by the Romans. They had vast quantities of a most excellent sand called puzzolana. It is found near Naples, on the slopes of Vesuvius, and in great beds throughout that part of Italy. A similar material is found along the Rhine and again in the Mediterranean, where it is known as Santorin earth, from the island of Santorin in the Grecian Archipelago.

The composition of these is similar, and consists of about fifty per cent silica, sixteen per cent alumina, twelve per cent iron oxide, nine per cent of lime, and small proportions of other ingredients, chiefly alkalies.

The distinctive quality of the puzzolana lies in its power of uniting quickly with lime to form a cement mortar. The silicates are of such a quality as to unite readily with nascent lime. The lime rock was quarried near at hand, and when burned was immediately slacked with water and mixed while hot with the puzzolana. The mortar so formed was used at once, being in some cases mixed with sand to prevent excessive shrinkage.

The wall construction was carried on in successive layers of stone and puzzolana mortar, and the result was ultimately a hard, compact, rigid concrete wall. Once in place the concrete continued to harden indefinitely, and its marvellous lasting quality is witnessed in the ruins of those ancient works, which would have long been swept away but for the solidity and massiveness of the concrete masonry.

The puzzolana is still in great demand and makes the finest mortar in the world. The catacombs of Rome were formed by the excavation of the vast quantities of this remarkable sand, used in the Roman works. The presence of a moderate quantity of alumina in its composition renders it moderately hydraulic; and although its slowness of setting limits the range of its usefulness in damp localities, it is an interesting fact that when Smeaton rebuilt the Eddystone Lighthouse in 1756, he used for concrete Aberthaw nefra lias lime, which he burned on the works, and puzzolana sand shipped from Civita Vecchia.

II.

It is proposed in subsequent papers to describe the essential characteristics of limes and cements with a view to arranging the various kinds in the order of their importance in building construction.

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MORTAR COLORS AND STAINS.

THEIR USE AND ABUSE.

THE practice of using artificial coloring for mortars and cements has been in vogue more or less for two thousand years back, but the general use of mortar colors and stains is of comparatively short duration, indeed within the memory of the present generation.

There is no doubt but that its increasing favor and demand by architects, builders, and the trade in general is a sure and unmistakable sign that mortar color has come to stay, coming more and more into use as its merits are understood and appreciated, until within the next decade it will not only be used in the more costly and larger buildings, but in factories, dwelling-houses, etc., and all the cheaper or common work.

Like all the important advances in architecture and other lines, it has taken years of careful study and experiment, attended sometimes by failure but finally by success, to bring its manufacture and application where it is to-day, nearly perfection.

The manufacture of stains and colors exclusively for mortars and cements was first attempted, we believe, several years ago by the well-known and reliable firm of Sam'l H. French & Co. of Philadelphia, Penn., to meet an urgent demand from leading architects for something which would add to the exterior ornamentation especially of brick fronts. The first obstacle which presented itself and which this energetic firm finally overcame was to secure something that would not deteriorate the quality of the mortar with which it was mixed; and having successfully put aside this difficulty, they turned their attention to the strength and durability of the color, endeavoring to produce an article that would materially increase the strength of the mortar with which it was used. After many tests and experiments this was finally accomplished, and the production of mortar colors took a long stride forward.

It may not be amiss at this time to review as briefly as possible the principal colors, and endeavor to show where they may be used to produce the best results.

Red. Of all the colors this is probably by far the most used and gives the best satisfaction, whether used to produce a massed effect with red brick, which is generally the case, or in contrast with buff Zanesville, Milwaukee, or Pompeian bricks. Probably the best brand for all-around work, and certainly a general favorite throughout the United States, is that made by the Clinton Metallic Paint Company and termed "Clinton Hematite Red." It contains seventy per

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Guaranteed to stand all required tests. **115 Broadway, NEW YORK.**

cent of iron oxide, and when mixed with lime mortar considerably hardens and strengthens it. This color is also used to a large extent on sandstone and granite work, of which a good sample is furnished by the Boston and Albany Railroad Station at Springfield, Mass. This color will cost about two cents per pound, and will require fifty to sixty pounds to color sufficient mortar for one thousand brick.

Brown. Brown is being largely used at present with dark red brick in massing, but contrasts pleasantly with nearly every color but red. Some authorities consider brown the strongest color used, but on what grounds is not made plain; its cost is about the same as red.

Black. In using black it will be found necessary, in order to get the best results, to get the best brand to be had. Lampblack is never satisfactory, as it causes the mortar with which it is mixed to become spongy, thereby increasing the liability of the bricklayer to daub the work, which is hard to prevent with the best color. Powdered coal, foundry sand, and forge blowings are sometimes used, but furnish a poor substitute indeed. Great care must be taken in making black mortar to mix it thoroughly in the bed, and thus prevent the possibility of different shades of mortar when the work becomes dry. Color for mortar to lay one thousand bricks will cost about sixty cents.

Buff. Generally used in massing buff brick, just now much in favor in this country, but forms a beautiful contrast with black or red. Cheap brands are liable to fade, but the best will not.

This color costs about the same as brown.

As before stated, these four colors are the principal ones, but there are several other shades used more or less. Among them, green, Pompeian buff, royal purple, French gray, and colonial drab are the most prominent, and form pretty contrasts to some shades of brick, and it costs about $1.20 for color for one thousand brick.

One great objection brought forward by critical minds to the use of mortar colors is that it fades. To a certain extent this may be true in the case of cheap brands and lack of skill in its application, but good mortar colors, when properly mixed with the mortar, seldom, if ever, fade. A few simple directions, if properly followed, will insure good results. Mix up your mortar the same as usual, if possible a day or two before you want to use it. The object of this is to give the mortar an opportunity to cool before adding the color, as the hot lime is liable to diminish the strength and dim the color. Be careful to have the mortar well tempered when the color is added, and, to insure uniformity, give them a thorough hoeing together. It requires about forty pounds of the black, and sixty pounds of the red, brown, buff, and most all other colors, for sufficient mortar to lay one thousand brick. These proportions vary according to the thickness of joint and depth of color desired. The color which comes in putty form is preferable to the dry, we think, but should always be kept damp to prevent it from hardening, and thus make it difficult to mix with the mortar. After opening the package, keep a small quan-

ATLAS PORTLAND CEMENT.

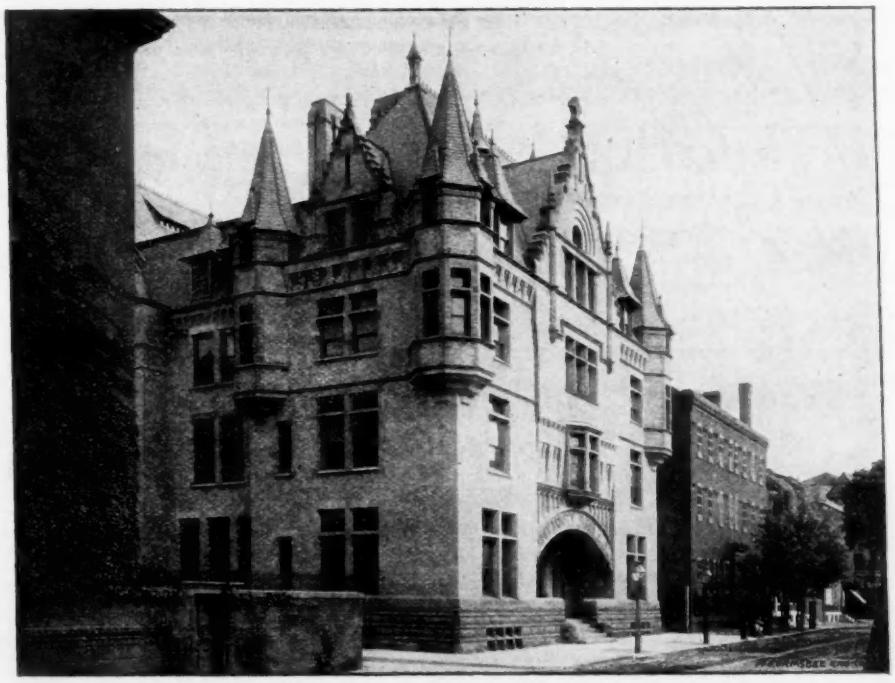
WARRANTED EQUAL TO ANY AND SUPERIOR TO MOST OF THE FOREIGN BRANDS.

OFFICIAL TESTS, Nos. 3567 and 3568, made by the DEPARTMENT OF DOCKS, New York, March 31, 1894, being part of contract No. 464 for 8,000 barrels.

TENSILE STRENGTH, 7 days, neat cement	622 lbs.
" " 7 days, 2 parts sand to 1 of cement	332 lbs.
Parts steamed and boiled	Satisfactory.

All our product is of the first quality, and is the only American Portland Cement that meets the requirements of the U. S. Government and the New York Department of Docks. We make no second grade or so-called improved cement.

ATLAS CEMENT COMPANY, 143 LIBERTY STREET, NEW YORK CITY.



Holy Trinity Parish House,

PHILADELPHIA.

◆◆

Buff and Pompeian Brick Laid in Clinton Hematite Red.

◆◆

Messrs. Hewitt & Bro., Architects, PHILADELPHIA.

◆◆

Messrs. Dorsey & Smith, Builders, PHILADELPHIA.

◆◆

. . ILLUSTRATION FROM . .

"A Little Talk on Metallic Paints and Mortar Colors."

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CLINTON METALLIC PAINT CO.,

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High Grade Mortar Colors and Metallic Paints.

Eastern New England Agents:

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tity of water on the color, which must, however, be removed before using. Last, but not least, never wash down a building with any acid but muriatic, and that not too strong, as all acids will take out the color more or less.

One advantage in using colored mortars is the opportunities they furnish the builder of using rougher brick and odd shades. A building laid up with red mortar and common ordinary brick as they come from the kiln will make a much better appearance than the same brick culled and using white mortar.

Another use to which mortar colors are put at the present time is for tinting the finishing coat of plastering, and when properly executed makes an excellent appearance. The following shades may be produced from the four principal colors: red will make tints from light pink to dark terra-cotta; brown, from light reddish brown to Bismarck; black, pearl color, French gray, and steel; buff, from leather color to heavy buff. Blackboards for schoolhouses may be colored with the black.

The colors should be thoroughly incorporated with the white stuff before running off, in such quantities as may be necessary to make the desired tint. It requires about three quarters of a pound of color to a square yard of plastering. This is applied in the usual manner. Care should be taken, however, in making a hard finish, to keep the slobber off the trowel.

New Britain, Conn. R. N. Buell.

BOILING TEST OF CEMENTS.

Office of Booth, Garrett & Blair,
Chemists,
Philadelphia.

Editor Brickbuilder:

Sir, — I note the item in your paper in regard to boiling tests for cement. Our firm has kept a boiling apparatus in use for rather more than a year past, and, in addition to regular tests, have made a great many experiments. As a result of this experience, we are inclined to doubt the efficacy of the boiling tests as a means of detecting free lime.

A paper dealing with the matter more fully will be presented before the A. Soc. C. E., in September.

Yours truly,

Frederick H. Lewis.

THE USE OF ROCK EMERY FOR GRINDING.

IT is only within a comparatively recent period that any improvement has been made in millstones, but this advance has been of a most important character, and consists in substituting for the ordinary millstone, grinders made of blocks of rock emery. Emery possesses all the properties of an ideal grinding stone. In hardness it is scarcely surpassed by the diamond, and has no equal as a destroyer of all other substances. The surface of a block of emery can be smoothed to any degree for fine grinding, yet the face never glazes, but remains sharp under all circumstances. It is remarkable that this substance has been so long practically unknown to millers; but heretofore it has not been thought possible to form so refractory a material into any regular shape. By the happy expedient, however, of setting the large blocks of emery in bronze, this has finally been accomplished, and a strong stone constructed that is as nearly indestructible as a millstone can be.

The metal in the face of this millstone, being softer than the emery, wears slowly away, slightly exposing the hard emery edges that cut like sharp files. The slightly recessed metal surface forms a honeycombed face far superior to that of the best French buhr, and infinitely harder and more abrasive.

The rock emery millstone is exactly like the old stone, except that it is made of a substance as much harder and sharper than the best French buhr, as buhr is harder than soapstone.

Rock emery millstones are made in sizes to fit any mill frame, and can take the place of other stones without any change whatever. They are the fastest and steadiest fine grinders known, as it is never necessary to stop the mill, except in grinding hard rock to dress down occasionally the stone eye and furrows, which are made of softer material, so as to be easily cut away. The emery face never requires it.

Rock emery millstones are only slightly more expensive than French buhrs, which they can easily grind to powder. They never fail to replace other grinders when run in competition with them. They of course grind wet or dry, the same as other millstones, and are managed in exactly the same manner, only, as before stated, the durability of the emery face is such that it never requires to be picked. They are made sharp and stay sharp.

These millstones are made in large numbers by the Sturtevant Mill Company, No. 88 Mason Building, Boston, Mass., sole manufacturers. Send for circular.

ABERTHAW CONSTRUCTION COMPANY (Incorporated),

CONCRETE ENGINEERS

FIREPROOF FLOORS (Ransome System).

For Public Buildings, Hospitals, Schoolhouses, Office Buildings, Warehouses, Breweries, Stables, and Dwellings.
Contracts taken for all work in Portland Cement Concrete.

Foundations, Bridge Piers, Engine Beds, Retaining Walls, Pavements, Self-supporting Sidewalks and Sidewalk Lights (Ransome Patents).
Best Materials and Highest Skilled Workmanship.

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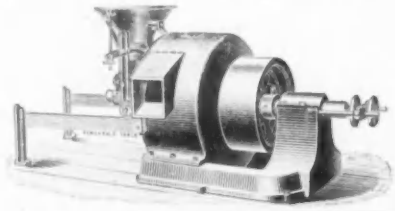

Sturtevant Rock Emery Mills

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TRADE

ROCK EMERY MILLSTONES.

MARK.

FIT ANY MILL FRAME.

Fastest fine grinder known.
Sturtevant Patent Vertical Mill has no rival for reducing ***Plaster, Paints, Chemicals, Carbons, Talc, Soapstone, Slate, Barytes*** and like materials. 30" Mill Costing but $400, grinds to fine powder fiom 1 to 4 tons per hour. No foundations, no screens, no noise, no dust. Remember that for $400 you have a machine that is ***ready to run*** and that will keep running longer without repairs than any other fine grinder. Send for special circular.
Made of Blocks of Rock Emery set in Metal, making the hardest and most cutting millstone ever built, and not expensive.

A Customer Writes:

Sellersburg, Ind., June 25, 1894.

We can grind from 70 to 75 bbls. Louisville Cement per hour with your Rock Emery Stones. This is from 10 to 15 bbls. more per hour than our ordinary stones will grind. Since May 3 have dressed these but twice. Ordinary Stones we dress every three days. Rock Emery Stones save us several dollars per week in dressing alone.

CLARK COUNTY C. CO.

RAPID — because Rock Emery has no equal for cutting qualities. ECONOMICAL — because Rock Emery is the most durable grinding surface known. NO EXPERIMENT — because many large manufacturers in your own line already use and indorse them, and hundreds in use for other purposes.

SEND FOR CIRCULARS AND REFERENCES.

STURTEVANT MILL COMPAMY, 70 KILBY ST., BOSTON.

THE MANUFACTURER.

A Department devoted to the Market Side of Clay Production.

ROMAN-SHAPED COMMON BRICK.

REASONS FOR AND AGAINST ITS MANUFACTURE.

WE published in our last issue a letter from a correspondent inquiring whether common brick had been or were being made Roman shape, that is, 1½ x 4 x 12 inches in size. We commented upon this inquiry editorially and called for the opinions of architects, brick manufacturers, and machinery men as to the demand for such a brick and the practicability of manufacturing.

The only communication from a brick manufacturer was that from the Kensington Brick Co., which we give here and to which we call the attention of all architects favorably inclined toward the Roman-shaped common brick.

KENSINGTON BRICK COMPANY, 79 Fourth Avenue, Pittsburgh.

"In reply to your inquiry in the June number, would state that we made a red Roman brick on the Simpson dry-press machine which was used in the Carnegie Office Building, located on Fifth Avenue, this city, which is about seventeen stories high.

"In reply to your inquiry for common stock brick, Roman size, would say that we can make a stiff mud brick, Roman size, and have made them, but there being no demand in this market for same, we of course stopped. We can make the brick by either the stiff-mud or dry-press process, and should there be any demand for same in your market we would be glad to quote prices. We are about commencing on an order for Norman tile made on the stiff-mud machine with rock face for a church in Pittsburgh, and we think it will make a handsome building. We are in shape to make anything there is any market for."

We have also received many letters representative of the machinery side of the question, which would indicate that there is no obstacle in the way of manufacturing such a brick unless it be in handling the brick after it leaves the machine. One of these which expresses the general opinion we quote below. It is from

THE MCLAGON FOUNDRY CO., Brick Machinery Department, J. Wheaton Stone, Manager, New Haven, Conn.

"We have noticed the inquiries regarding the manufacture of common stock brick in Roman shape that appeared in THE BRICKBUILDER last month. We can think of no insurmountable objection, providing the market calls for them. They may be successfuily made by any of the prevailing methods of manufacture; and they are, but usually in small quantities and from high-priced material, producing fancy colors. Made in large quantities we should say they wouid be a little more expensive than brick of ordinary shape. They contain about the same amount of material, and we presume they may be made and dried as cheaply as any. Owing to their shape, probably, they could not be handled and set in the kiln as readily, nor are they quite as convenient to handle after they are burned. There would naturally be a greater loss from breakage. The cost of burning, we presume, would be about the same as the ordinary size. To make them cheaply, therefore, it is not a question of machinery so much as it is the expense of handling them after they leave the machine. If the market were great enough to enable the brickmaker to make them exclusively, they could be made to better advantage than when mixed with other sizes. They could be made with our 'New Haven' machine as readily as brick of ordinary size. However, we doubt if Roman brick will prove as satisfactory for general building purposes as the standard size, and therefore do not anticipate that the demand will be sufficiently large to warrant an extensive production."

The expression of opinion that we have received from architects is most gratifying. The majority of them speak decidedly in favor of the manufacture of such a brick, and we have no doubt that at least seventy-five per cent of American architects would regularly use a good quality common brick made Roman shape for exterior work in a great many places where they would not use the standard shape. A few of the letters we have received speak discouragingly of manufacturing such a brick, and these we quote from first.

VONNEGUT & BOHN, Indianapolis, Ind.

"We do not believe that there would be a very great demand for such brick from this locality."

KENDALL & STEVENS, 8 Oliver Street, Boston.

"Personally we do not see any advantage in making common brick in this size and shape. The additional care needed to produce a reasonably straight brick, and the greatly increased danger of fracture under concentrated load, seemed to us to offset the advantage of greater bond, unless the bricks were to be like the old Roman bricks, almost vitrified in burning."

W. J. MARSH, 1503 Pennsylvania Avenue, Washington, D. C.

"Sometimes from an æsthetic point of view the Roman-shaped bricks are desirable for exterior work, and when massed they reduce the scale and apparent size very considerably. The labor of handling them, however, is greater than for standard bricks, and I see no advantage in the use of this size for common bricks, the standard size being more economical in every respect, and as good constructively as the Roman."

There are none of the above we believe who would not avail themselves occasionally of Roman-shaped common brick. They merely doubt the expediency of manufacturing such a brick, believing that the greater expense would stand in the way of their use. Out of the total number of letters that we have received, however, the opinion is so decidedly in favor of this brick, even at a little higher proportionate cost than the standard shape, that we are certain it would pay those manufacturers of common brick who are near large markets to try the experiment of manufacturing the Roman shape and bringing it directly to the attention of architects in their respective localities.

HAPGOOD & HAPGOOD, Architects, Hartford, Conn.

"We would be very glad to use the common brick made in Roman shape."

NOLAN, NOLAN & STERN, Architects, Rochester, N. Y.

"We think that if common brick were made of Roman-shape size they would be used occasionally by architects when the occasion required; for example, in order to obtain some special effect in wall surfaces, pointing, etc.

"We trust that if common bricks are made in this size and kept in stock, we will be advised of the fact. We will, no doubt, have opportunities of using them in some of our work."

MUHLENBERG BROS., Reading, Penn.

"We are very much in favor of a Roman-shape common brick, and would use it frequently. It would give more play in detail, and make a finer moulding. We are glad you are agitating the subject, and hope to see the manufacturers introduce them."

GREEN & WICKS, 110 Franklin Street, Buffalo, N. Y.

"In reply to your editorial asking an opinion on the subject of Roman-shape common brick, we have to say that we would be very glad to use the same if they were procurable, and hope that they will be before long."

EDW. OGDEN & SON, Albany, N. Y.

"We have seen the articles in your June number, and think that Roman shape common brick would, if put on the market, receive instant recognition as being capable of very effective work. It is impossible to set any standard size, as sizes vary in different localities, but it might be very conveniently the depth and width of common brick and half as long again."

MOSES & KING, 431 Walnut St., Philadelphia.

"We would consider a common brick stretcher, Roman size, an exceedingly useful article, and would not hesitate in saying we could place them in many buildings where the 'ornamental' bricks are too expensive. Trust you may succeed in your good efforts."

WARREN & BACON, 9 Park Street, Boston.

"We noticed an inquiry with regard to Roman-shaped common brick, and your editorial on the subject in the June number of your paper. We are sure that any brick manufacturer who would manufacture a good common brick of this shape would find an immediate demand for it. We ourselves should be glad to use it on every opportunity. We believe that the manufacturer could charge one third more for Roman-shaped brick, to allow for the necessary greater care in handling and probable waste, and still find customers. The bricks would require no more clay, and no more room in the kiln or in carting."

WM. MARTIN AIKEN, Johnston Building, Cincinnati.

"I do not know of any manufacturers who make common brick in Roman shape. At the time when I was a student in the office of the late H. H. Richardson he had common brick made to order for Sever Hall, Cambridge, and Trinity Church Rectory, Boston; these bricks, as I remember them, were 12" long and 2¼" thick. If a sand-struck brick 1¾" x 12" could be placed upon the market cheaply, I, for one, would be very glad to encourage its use in suburban architecture, for the sake of the softness and richness and depth of color not otherwise obtainable."

MARSHALL S. MAHURIN, Fort Wayne, Ind.

"Your editorial relative to an expression of opinion on Roman-shape common brick cannot fail to meet my approval. Of course such are not in this market. We have a very fine standard shape common brick, in color a yellowish red, rather dark. We have used the same in connection with a mortar stain near the color of the brick as we can get, and from an artistic point of view we have a result superior to a press brick, getting a very soft plushy surface, with a delicate variegated effect and entirely free from the dead, waxy tone so common in first-class brickwork. Should Roman-shape common brick be produced, think they would be appreciated by the profession, especially the darker shades of red and yellow."

YARNALL & GOFORTH, 14 South Broad Street, Philadelphia.

"Replying to your editorial in the June BRICKBUILDER in regard to making common brick in the Roman shape, we beg to say that we would be very glad to see such an article on the market, and we believe it would have a large sale. There are many times when it could be used with most excellent results. Rough, hard bricks, unfortunately, are looked upon by many clients as cheap and unfit for use in a good building, but we believe if they were made up in the Roman shape, clients would be more willing to accept them as a proper facing for front walls. At this writing we have an operation just going into the contractors' hands in which we would gladly substitute Roman shape for the standard size common brick specified, if we knew where they could be obtained at a reasonable price."

J. A. DEMPWOLF, York, Penn.

"It would be a pleasure to lay up many of our walls which are now built with common standard brick in the Roman size, thus making a much more attractive appearance.

"I remember seeing in Rome many of the old walls built with thin, long common bricks throughout, the bond of which, no doubt, accounts to some extent for the strength these walls possess.

"I think, however, that the increase of labor and the consequent cost of manufacture, besides the greater care required in handling the Roman-size bricks, will debar them from becoming popular for the building of ordinary walls.

"I do not know of any manufacturer who makes common Roman-size bricks, but shall watch with interest the opinions of your readers."

C. H. MCCLARE, 613 Main Street, Cambridge, Mass.

"In regard to your editorial in the June number *re* Roman-shape common brick, I would say that I think that there is no doubt that if they were made there would be a market for them. They could be used for bonding with the mottled varieties, or would give a good texture to a wall surface laid up with them in common or Flemish bond, and would make stronger work than the common bricks. The question is whether they can be made as easily or cheaply as the common brick. From what I have seen of the manufacture of the latter, I should think that they might, as they are thinner, and would burn more quickly, thus requiring less fuel and attendance. I wish to say a word in commendation of THE BRICKBUILDER. It fills a place that is not covered by any other architectural paper in this country, and I am sure it deserves great success."

FRANK MILES DAY, 925 Chestnut Street, Philadelphia.

"I am of the opinion that common bricks of Roman shape could be very advantageously used. When travelling in the North of Italy last winter I saw so many examples in which such bricks were successfully used, that the question why our manufacturers in America did not make them was continually forced upon me. I am sure that if put upon the market they would be used by many architects. The regular Roman size, 1½ x 4 x 12 inches, would be a very good size; but I do not see why the common-size brick, if made one and one half inches thick, could not also be used with advantage, though, doubtless, they would look no better in the wall than the Roman size, and might be harder to handle. If the price of such brick could be kept down close to that of common brick, I mean good stretcher or hard straight, dark red, hand-made bricks, there would, I have no doubt, be a considerable market for them."

GUY KIRKHAM, Springfield, Mass.

"The red brick is like the bay horse, — the most satisfactory, by all odds, to have in the majority. So many structures are being built of buff, cream, and the light-colored bricks, that we value and desire the common red as a relief and a contrast. A good quality common brick in Roman shape would be warmly welcomed by the architects. The uncommonplace shape and with it the lower cost would insure its wide acceptance. The possibility of getting the color and texture of common red brick in combination with the existing colors and textures in Roman shape opens a most inviting field."

Yard Equipment.

DECISION OF UMPIRE OF JOINT COMMITTEE, MASON BUILDERS' ASSOCIATION AND BRICKLAYERS' UNION.

I have carefully considered the arguments on each side of the contention between the Mason Builders' Association and the Bricklayers' Union No. 3 of Boston and vicinity, as given at the hearing, Wednesday, June 27, and herewith state briefly the points at issue and the conclusion forced upon me.

The members of the committee of the Mason Builders' Association aver that, in consequence of the present depressed condition of business building has decreased, values have declined, and that, at the former rate of wages and material, there is no inducement for owners of real estate to venture on new enterprises. They therefore ask that the reasonable reduction in wages of bricklayers of 4 cents per hour, or about ten per cent, be yeilded, from date to Jan. 1, 1895. The present agreement is on the basis of 42 cents per hour and eight hours a day, overtime to be paid for at an added rate of 50 per cent or "time and half," as it was expressed.

Collateral arguments and instances were adduced, but the above is the chief ground upon which abatement is asked. Selfish interest was disclaimed, and the lessened wage, the builders believed, by stimulating business, would result in more and steadier work for the bricklayers.

To which the members of the committee representing the Bricklayers' Union rejoined:—

First.—That the gravity of the alleged depression was exaggerated, and they endeavored to show from figures obtained at the office of the inspector of buildings that the first four months of 1894 show an increase in the number of completed buildings above the same period of 1893, implying that the hard times had failed to materially injure the building business.

Second.—A weighty reason why wages in Boston should not be cut was their present low rate as compared with other cities of the country, New York, Baltimore, Indianapolis, and Denver paying 50 cents per hour, Philadelphia 45 cents, St. Louis 55 cents, and Cincinnati 56 cents, all on a day of eight hours. Buffalo pays 36 cents and St. Paul 45 cents, both on a day of nine hours.

Third.—The irregularity of work and the large amount of time lost through enforced idleness—not only from cessation of outside bricklaying in wintry weather but from unavoidable delay of material and waiting for other mechanics at all times—really reduces the seemingly high rate of wages to a low average. It was affirmed and not denied, that the average workman does not earn over $11 to $12 per week, or about $600 per year.

Other contentions there were, but the three given cover the points deserving attention.

The amicable spirit of both parties and the evident desire to arrive at a just conclusion were manifest. In the same spirit let me consider the points raised.

I agree with the Mason Builders' Committee that the present depression is serious; that buildings have been put up on speculation in excess of the demand, that new enterprises are checked, contracts are few, and that the large number of empty houses for sale and numerous idle bricklayers are sufficient to show the situation. I am not convinced, however, that a small abatement of mechanics' wages will stimulate new business.

The first contention of the Bricklayers' Union Committee is baseless and misleading. The increased number of buildings completed in the first four months of 1894 does not disprove the great depression, for it is evident that the initation of these completed buildings antedates the panic. If the dates of beginning and the length of time occupied in the building were given, the statistics would be found valueless in this discussion.

The second objection urged against the cut of wages proposed is the comparative low price paid in Boston when the other great cities are considered. On its face it is a strong point, but conditions are always found on examination to account for the discrepancy. If there were no counterbalancing advantages in living in Boston over living in Cincinnati, it is safe to say that with bricklayers' wages at 56 cents per hour in the latter place as against 42 cents here, there would be a hegira of workmen from this city to that. But the fact remains that, instead, bricklayers are drawn to Boston, and, as appeared in the testimony, from cities where the nominal wage is higher.

An agreement of 50 cents per hour in Denver means nothing when building is paralyzed, as at present, and employment in that line practically suspended.

The third reason for leaving undisturbed the current pay has decided force, correcting the unwarranted conclusion that large wages per hour are necessarily large in the gross, as was satisfactorily explained, by unsuitable weather and inevitable delays from causes beyond the bricklayers' control.

I deem it unnecessary to elaborate further the arguments or pleas advanced on both sides, and proceed to give the conclusion I have reached.

If the hard times and the dulness in building were caused by excessive wages paid to bricklayers and other similar mechanics, there would be ample reason for granting the mason builders' request. But it is evident that such is not the case and that some undefined cause makes the lot of both parties a trying one. Attempting to curtail the earnings of either cannot therefore be effective. Moreover, the mason builders have this advantage, they enjoy opportunities for profits on contracts that may furnish a fund with which to tide over such times as the present. The bricklayers have no chance for exceptional profits, and, while their wages may be adequate to support themselves and families in prosperous times, they are in trouble when work fails them.

Again, for the mechanic to raise his wages is a hard and slow process, and if lowered to meet an emergency involves great exertion to recover them as times improve. They are consequently the last item of expense to be deliberately reduced.

It may pertinently be asked, if wages were fixed at thirty-six cents instead of forty-two, who would benefit by the concession? Chiefly the mason builders, who have unfinished contracts estimated at the higher figure. It would be a transfer without consideration from the laborer to the employer. New contracts would be figured on the cut rate, and unless increased building resulted from diminished wages, nothing would be gained.

My own belief is that the primal cause of the cessation of building centres in the excessive and speculative advance in land values (aggravated by the financial distrust of our national credit) and that the return of better times must be preceded by the decline of the prices demanded for land. When they fall capital will again be encouraged to invest in new buildings. Land values are the last thing to decline in a panic, but until they do enterprise is checked and labor waits. The real enemy against whom both builders and employees should unite is land speculation, for he who controls the opportunity controls also the profits of him who uses it.

Convinced, therefore, that no general gain will accrue to the mason builders by the cut of the bricklayers' wage, and that the amount is too small to signify for the stimulation of business, I therefore decide that no abatement from the current rate be made.

Permit me to express my gratification, in view of the deplorable labor conflict now raging in the West, that you have instituted this fair and reasonable method of adjusting your differences of opinion.

Respectfully,

[Signed.] WM. LLOYD GARRISON, Referee.

BOSTON, July 6, 1894.

THE United States Brick Press Works, 72 West Washington Street, Chicago, have recently issued a new condensed sheet containing information in regard to their well-known press. Any parties interested in presses should not fail to write for this circular, for it is businesslike and to the point.

THERE are front brick and front brick, but certain it is that the particular front brick which Webster, Gillespie & Co. of Philadelphia are turning out by the aid of their new Simpson presses need not shrink from comparison with any on the market. To produce face brick that will answer the requirements of to-day is by no means an easy matter. There is no continued run of luck in it. It means attention, skill, and modern appliances. With these you may turn out good uniform brick, at least you may take chances on doing so; but lacking any one of these three, and you may assure yourself that you are not taking chances, for in truth you have no chance at all. You are out of the race, and must take a back seat, while your more enterprising competitor wins the prize. Remember, "Those were the good old times," won't do for a motto for the successful yard of to-day.

THE SIMPSON BRICK PRESS.

The only American brick machine to receive official recognition from the authorized judge on brick machinery at the . . . . . .

WORLD'S COLUMBIAN EXPOSITION.

It is replete with time and labor saving devices, and its product always commands the highest market price by reason of their beauty and hardness.

In no single detail of its *simple*, *powerful* and *ingenious* mechanism is this press susceptible of improvement. We are also manufacturers and dealers in full brick-yard equipments, and are prepared to estimate on and construct complete plants. We are also prepared to test all brick-making material sent to our address in Chicago. For prices, terms and other information, address,

THE SIMPSON BRICK PRESS CO.,

No. 415 Chamber of Commerce Building, - - - - Chicago, Ill.

Agents for Canada, WATEROUS ENGINE WORKS CO., Brantford.

Clay Materials.

NOTES FROM BERLIN'S BRICK INDUSTRY.

THE STANDARD BRICK COMPANY is the latest addition to the brick yards of Berlin. The new company is the result of the efforts of Messrs. Whitney & Dickinson, who have long had the project in view. The yard is to be situated just east of C. P. Merwin's, and a side track from the main line of the N. Y., N. H. & H. R. R. to the yard has already been laid. The boilers are being set and the engines bedded by the H. Wales Lines Company of Meriden, Conn. The supply of good clay is sufficient to meet the greatest demands for years to come. Mr. Frank C. Whitney, formerly the genial bookkeeper for M. E. Jacobs, is to manage the new concern, and under his skilful hand, with the aid of improved machinery, this yard should, and probably will, turn out a fine quality of brick. It is his intention to take up all the branches of the business, and, when fully started, expects to turn out eight to ten million brick annually.

THE NEW BRITAIN ARCHITECTURAL TERRA-COTTA COMPANY are being pushed with orders, and report trade good.

M. J. DONNELLY BRICK COMPANY are, as usual, under full swing, and are trying hard to keep up their reputation as the busiest concern in Berlin.

THE YALE BRICK COMPANY are about to burn a kiln of pressed brick, made from dry pressed shale rock. This is quite a novelty in the pressed brick line, as it was formerly thought impossible to make them from shale alone, without the addition of clay. The color is rich mahogany.

M. E. JACOBS is furnishing brick for the new Orphan Asylum in Meriden, Conn., and has the usual force of help employed.

THE Central Press Brick Company have recently made a change in the location of their Chicago office, and may now be found in the Medinah Temple, Room 809, 185 Jackson Street. Mr. Charles T. Harris has assumed the management of this office, and will be only too glad to submit samples and make prices on any goods manufactured by his company. The new catalogue which they have recently issued gives some of the latest results in shapes secured by them, to which they invite attention. The high standing of the goods made by the Central Pressed Brick Company is by far too well known to need any further mention. We congratulate Mr. Harris on having such a fine line to handle, and wish him the best of success.

A NEW hydraulic company, called the New York Hydraulic Press Brick Company, is now being built at Canandaigua, N. Y. E. C. Sterling of St. Louis, president; H. W. Eliot of St. Louis, secretary and treasurer.

This is one of the numerous branch companies of the old original Hydraulic Press, Brick Company of St. Louis, and they will make red, buff, and various kinds of mottled brick. Capacity will be on the start 5,000,000 front brick per annum.

THERE is plenty of clay in the New England States, and plenty of capital to invest in a manufacturing business that has a certain and profitable future in it. The Clay Shingle Company would like to see at least two factories started in these States, with the exclusive right to manufacture their roofing tile. See advertisement in another page. They will be glad to furnish information to parties with idle clays and idle capital.

Miscellaneous.

WE are glad to call attention to the last edition of Hendricks' Architects' and Builders' Guide and Contractors' Directory of America. It is a volume worthy of high praise, since it covers very completely and correctly the class that come within its field. There has been need of such a volume that was authentic and up to date. Our own considerable experience and acquaintance in this direction would lead us to pick the flaws quite readily in such a work of reference if they were there. We have found it all that it should be in this respect. In construction and arrangement considerable attention has been evidently bestowed, and one or two special features introduced that are very desirable. We would advise any parties using such works to obtain one of these volumes.

DON'T put too low a figure on your goods; sales are not profitable unless there is something to be realized on the cost of production. Good work at a fair price is a maxim that generally brings success. We insert the following letter which bears upon this subject with a moral that is obvious: —

MR. I. P. FRINK, 551 Pearl St., New York.

Dear Sir, — Four concerns figured on lighting our church. Your estimate was the highest. We investigated them all. The committee was of the opinion that it was better to pay a little more and know what we would get than to pay less and take chances. The fixtures are now all in and are just right. Everybody is pleased with them. We don't know but what some of the other parties might have done as well for a little less money, but we believe in reputation, and that the man who has been in business the longest and has done the greatest business gives more for the money, and that the man who under-figures makes it up at the expense of the customer.

Sincerely yours,
WM. J. COOPER, Secretary.
By Order of the Board of Trustees First Presbyterian Church, Asbury Park, N. J.

AMONG the recent notable buildings in which the Morse Patent Steel Wall Ties are used is the Lincoln Park Palace, Chicago, Lauderdale Building, Providence, Woman's Reformatory, Bedford, N. Y. Architects and contractors are invited to write for samples and information to
J. B. PRESCOTT & SON,
Manufacturers, Webster, Mass.

GENERAL MANAGER TERRY of the Powhatan Clay Co., Richmond, Va., is out for business. On a recent trip East the following agencies were established: W. H. Gates, 30 Kilby Street, Boston; Pfotenhauer & Nesbit, Metropolitan Bldg., New York; and E. A. Keeling, 808 F Street, Washington.

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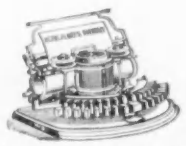

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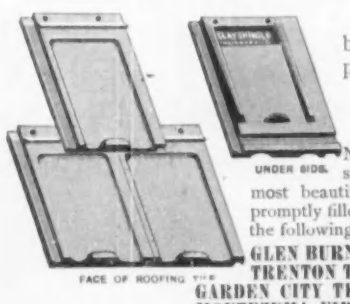

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For the Right to Manufacture under Patents on Royalty in any State east of the Mississippi not arranged for, address

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POMPEIIAN, BUFF, AND RED PRESSED, ALSO ORNAMENTAL **BRICK** OF ANY COLORS AND OF ALL SHAPES.
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BANK SAFES,
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